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Village-level changes in landscapes, land use and rural livelihoods: A case study of three villages in Nambak District, Lao PDR

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Antti Simppula

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Tiivistelmä – Referat – Abstract

The economy of Laos has been growing fast in recent decades, causing profound changes in rural livelihoods, traditional agriculture and the environment. The governments' land use policies aiming to restrict shifting cultivation are shifting the subsistence farming towards more market-oriented agriculture production. In addition, increased job opportunities, improved infrastructure and increased land pressures are affecting smallholder farmers' livelihood strategies. Despite the rapid economic growth, income disparities remain high in Laos, with high rates of poverty especially in rural areas remaining common. The rural households are often highly dependent on agriculture and forest resources for the income and food security. Therefore, it is important to study how the rapid economic transition and changes in agriculture affect their livelihood strategies.

The four research questions addressed in this study were 1) What are the main changes in households' livelihoods (– the strategies households create and follow to improve their livelihoods) and land use at village-level over the past 10 years? 2) How the forests/forest cover have changed in the village over the past ten years and what have been the main drivers for the changes? 3) How the smallholders' access to and availability of forest resources have changed over the past ten years? 4) What kind of shocks the households have experienced in the past 12 months and what have been their coping strategies to overcome the shocks? Primary data was collected using three different methods. Altogether 90 randomly selected households were interviewed in the three rural villages in Nambak district in Luang Prabang province. In addition, two separate focus group discussions with different gender and one key informant interview were conducted in each of the study village. Household surveys data was collected on households' demographics, main income sources and changes in capital assets and cropping. In focus group discussion data was collected on most important environmental resources, forests and landscape changes. In key informant interview data was collected on main characteristic of village infrastructure, history, forest cover and land use.

The study showed that the households have introduced many valuable cash crops and trees to their farms in the last 10 years. Improved access to markets and high demand for crops, (such as cardamom, galangal, broom grass and rubber) from neighboring countries has changed crop production, livelihood strategies and livelihood outcomes in study villages. The shift from subsistence agriculture to more cultivation of cash crops and more labour opportunities in large-scale cash crop plantations has increased household income. In addition, cash crop cultivation requires less labour input than replaced upland rice production. Livelihood shocks experienced by households were mostly crop failures due to drought, livestock losses due to diseases and severe illnesses of household members. It was found that households mainly coped with shocks by using cash savings, indicating that shocks were either relatively minor, or increased incomes allow them to overcome shocks without having to sell assets or other actions. In terms of changes in availability of forest resources, some of the non-timber forest products are reportedly over-harvested in the villages and there are less trees now than 10 years ago, especially in production forests, since local people have been cutting them for domestic use. In addition, forest cover has decreased, since forests have been cleared for rubber plantations and farmland.

The changes in crop production and intensification of land use has improved the households' overall income-level. Over 80% of the respondents thought their incomes have increased over the past 10 years. However, the cash crops price fluctuations and potential decline of sale prices can have negative impacts to the smallholders' livelihoods and food security. The households' resilience to cope with livelihood shocks is often dependent on the capital assets they possess. The relatively poor households are generally more vulnerable to livelihood shocks; therefore, having sustainable and diverse livelihood strategies is important in rural villages. In addition, the increasing land pressures from agricultural intensification and population growth, overuse of NTFPs, and large-scale cash crop plantations can lead to deforestation and forest degradation in the village areas.

Avainsanat – Nyckelord – Keywords
Rural livelihoods, Lao PDR, NTFPs, forests, cash crops, land use, livelihood diversity, shock coping, woodlot, rubber

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Tiivistelmä – Referat – Abstract

Laosin talous on kasvanut nopeasti viime vuosikymmeninä, muuttaen merkittävästi maaseudun elinkeinoja, perinteistä maanviljelyä ja ympäristöä. Hallituksen asettamien maankäytön linjausten tarkoituksena on rajoittaa kaskiviljelyä ja muuttaa omavaraisviljelyä enemmän kaupallisten viljelykasvien tuotantoon. Tämän lisäksi, lisääntyneet työmahdollisuudet, parantunut infrastruktuuri ja lisääntynyt maankäytön paine vaikuttavat pienviljelijöiden elinkeinostrategioihin. Nopeasta talouskasvusta huolimatta tulojen eroavaisuudet ovat pysyneet korkealla Laosissa ja etenkin köyhyys maaseudulla on tavanomaista. Maaseudun kotitalouksien tulonlähteet ja ruokaturva ovat yleensä hyvin riippuvaisia maanviljelyksestä ja metsävarannoista. Siksi onkin tärkeää tutkia miten nopea talouden kehitys ja muutokset maanviljelyksessä vaikuttavat kotitalouksien elinkeinostrategioihin.

Tutkimuksen neljä tutkimuskysymystä olivat 1) Mitkä ovat suurimmat muutokset kotitalouksien elinkeinoissa ja maankäytössä viimeisen kymmenen vuoden aikana? 2) Miten kylien metsät/metsäpeite on muuttunut viimeisen kymmenen vuoden aikana? 3) Miten pienviljelijöiden pääsy metsävarantoihin ja niiden saatavuus on muuttunut viimeisen kymmenen vuoden aikana? 4) minkälaisia shokkeja kotitaloudet ovat kokeneet viimeisen 12 kuukauden aikana ja millä tavoin kotitaloudet ovat selviytyneet mahdollisista shokeista. Primaarinen data kerättiin kolmella eri tutkimusmenetelmällä. Yhteensä 90 satunnaisesti valittua kotitaloutta haastateltiin kolmessa maalaiskylässä Nambakin alueella, Luang Prabangin provinssissa. Tämän lisäksi, joka kylässä järjestettiin kaksi erillistä fokusryhmäkeskustelua ja avainhenkilön haastattelu. Kotitaloushaastatteluilla kerättiin tietoa väestöstä, päätulonlähteitä sekä muutoksista kotitalouksien varallisuudessa ja maanviljelyksessä. Fokusryhmäkeskusteluissa kerättiin tietoa tärkeimmistä luonnonresursseista ja metsien tilasta. Avainhenkilöhaastatteluissa kerättiin tietoa kylän ominaispiirteistä, kuten historiasta, viljelykasveista, maankäytöstä ja metsistä.

Tutkimus osoitti, että kotitaloudet ovat alkaneet viljellä tiloillaan monia arvokkaita rahakasveja. Parantunut pääsy markkinoille ja viljelykasvien (kuten kardemumman, galangal-juuren ja raakakumin) korkea kysyntä naapurimaissa ovat muuttaneet viljelykasvien tuotantoa ja elinkeinostrategioita tutkimuskylissä. Muutos omavaraisviljelystä enemmän rahakasvien viljelyyn ja työmahdollisuudet suurilla plantaaseilla ovat kasvattaneet kotitalouksien tuloja ja vähentäneet tarvittavaa työpanosta maanviljelyksessä. Kotitalouksien kokemat shokit koskivat pääasiassa satojen menetyksiä kuivuuden takia, karjan menetyksiä sairauksiin ja perheenjäsenten vakavia sairauksia. tutkimus osoitti, että pääosin kotitaloudet selviytyivät shokeista käyttämällä käteissäästöjä. Tämä osoittaa, että shokit olivat suhteellisen vähäisiä tai kasvaneet tulot sallivat shokeista selviytymisen ilman, että varallisuutta pitäisi myydä. Tutkimus osoitti, että joitakin tiettyjä metsätuotteita kerätään liikaa kylien metsistä. Tämän lisäksi myös puut ovat vähentyneet viimeisen kymmenen vuoden aikana, etenkin tuotantometsissä, joista puita kaadetaan kotitalouskäyttöön. Tämän lisäksi, metsää on raivattu kumipuuplantaasien ja viljelymaan tieltä

Muutokset maataloustuotannossa ja maankäytön tehostamisessa ovat parantaneet kotitalouksien kokonaistulotasoja. Yli 80 prosenttia kotitalouksista ilmoitti tulojen kasvusta viimeisen kymmenen vuoden aikana. On kuitenkin mahdollista, että rahakasvien myyntihintojen vaihteluilla ja myyntihintojen alenemisella voi olla negatiivisia vaikutuksia pienviljelijöiden elinkeinoihin ja ruokaturvaan. Kotitalouksien shokkien sietokyky riippuu yleensä varallisuudesta, joita kotitaloudet omistavat. Suhteellisen köyhät kotitaloudet ovat yleensä haavoittuvaisia taloudellisille shokeille, siksi, kestävät ja monipuoliset elinkeinostrategiat ovat tärkeitä maaseutujen kotitalouksille. Tämän lisäksi on vaarana, että metsäresurssien liikakäyttö ja laajat rahakasviplantaasit voivat johtaa metsäkatoon ja metsien heikentyneeseen tilaan kyläalueilla.

Avainsanat – Nyckelord – Keywords
Maaseutujen elinkeinot, Laos, rahakasvit, maankäyttö, NTFP, metsä, shokki, kotitalouksien tulonlähteet, plantaasi.

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FOREWORD

This master's thesis was carried out as part of the master's degree studies in Forest Ecology and Management at the University of Helsinki, Viikki Tropical Resources Institute. Conducting the study and organizing the field work demands contribution of several people and I would like to express my gratitude to the people involved in this project.

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LIST OF ABBREVIATIONS

CIA – Central Intelligence Agency

DAFO – District Agriculture and Forestry Office

DBH – Diameter at breast high

DFID – Department for International Development

FAO – Food and Agriculture Organization of the United Nations

FGD – Focus Group Discussion

GDP – Gross Domestic Product

GoL – The Government of Laos

GPS – Global Positioning System

KIIs – Key informant interviews

Lao PDR – Lao People's Democratic Republic

LDC – Least Developed Countries

LFA – The national Land and Forest Allocation

LFAP – Land and Forest Allocation Process

LUP – Land Use Planning

LUPLA – Land-Use Planning and Land Allocation Programme

MAF – Ministry of Agriculture and Forestry, Lao PDR

NGOs – Non-governmental organizations

NTFPs – Non-timber forest products

OECD – The Organization for Economic Co-operation and Development

PLUP – Participatory Land Use Planning

TABI – The Agro-Biodiversity Initiative in Lao PDR

UNDP – United Nations Development Program

UNFPA – United Nations Population Fund

1. INTRODUCTION

Economic development in Lao People's Democratic Republic (hereafter, Lao PDR or Laos) is rapidly changing the livelihoods, traditional agriculture and environment ((Thongmanivong and Fujita 2006; Hepp et al. 2019). Shifting cultivation has been a dominant land use system in Laos for centuries but now there is ongoing change from swidden agriculture towards more market-oriented agriculture production ((Thongmanivong and Fujita 2006; Heinimann et al. 2013; Hepp et al. 2019). Common cash crops introduced by farmers in Laos are e.g. coffee, maize, cassava, rubber and sugarcane (The 8th Five-Year National Socio-economic Development Plan (2016–2020) 2016). Economic integration and the development of the infrastructure, such as roads in the remote rural areas has accelerated the economic transition ((Thongmanivong and Fujita 2006; Heinimann et al. 2013). One of the main drivers for the agricultural change is the Lao government's policies aimed at eradicating shifting cultivation. Policy-makers assume that swidden agriculture is one of the main reasons for deforestation and forest degradation (Heinimann et al. 2013; Kallio et al. 2019). Despite of the restrictive land use policies rural smallholder are still practicing shifting cultivation, since they often have no alternatives (Heinimann et al. 2013). The shifting cultivation has remained as an important livelihood strategy for the smallholder and, in addition as a fundamental coping strategy in case of a market- or a crop failure (Cramb et al. 2009).

Economic transition, climate change and increasing pressures on land could change the livelihood strategies of the rural households in Laos. It is important to study how these changes affect the poor communities, which are highly dependent from environmental resources for the income and the food security. The objective of this study is to find out what kind of changes there have been in village landscape and smallholders' livelihoods in the past ten years and what are the main drivers for the changes. The study also examines has there been any changes in households' access to and availability of forest resources. In addition, the objective is to examine the shocks which households' have experienced and their coping strategies with the possible shocks.

1.1 Research questions and the hypothesis

1. What are the main changes in households' livelihoods (– the strategies households create and follow to improve their livelihoods) and land use at village-level over the past 10 years?

2. How have forests/forest cover changed in the study villages over the past ten years and, what have been the main drivers for the changes?

3. How has smallholders farmers' access to and availability of forest resources changed over the past ten years?

4. What kind of livelihood shocks have households experienced in the past 12 months, and what have been their coping strategies to overcome the shocks?

The overall hypothesis is:

H_1: The hypothesis is that households are more dependent on forest resources and traditional agriculture such as shifting cultivation in more remote villages. There is also general trend in decreasing of availability of forest resources over time. Households' livelihood activities and cash income sources are more diversified in more urban villages, whereas households in remote villages get their cash incomes mostly from the crop sale.

2. THEORETICAL FRAMEWORK

2.1 Livelihoods

A livelihood, and what constitutes a sustainable livelihood can be defined in many ways. The Department for International Development (DFID) has adapted clear definitions for the terms from the article "Sustainable rural livelihoods: practical concepts for the 21st century" by Chambers and Conway (1992) "**A livelihood** comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. **A livelihood is sustainable** when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base." (Chambers and Conway 1992).

2.2 The sustainable livelihoods framework

In this study the sustainable livelihoods framework is utilized to clarify the broad and complex topic of rural livelihoods. The framework is useful in planning the study and designing the questionnaires. The sustainable livelihood framework describes the factors affecting the people's livelihoods opportunities (Figure 1). Households' livelihood assets are divided in five different capital assets: Human capital, Natural capital, Financial capital, Physical capital and Social capital (Serrat 2017). **Human capital** consist e.g. household members' education, skills, health and nutrition. **Natural capital** consist e.g. land, forests, water, environmental services and all the forest- and aquatic resources. **Physical capital** consist e.g. infrastructure, water supply, energy, communication and tools and equipment. **Financial capital** consist e.g. cash savings, access to financial services and all the inflows of money. **Social capital** consist e.g. social networks, memberships of groups, shared values and behaviors (Serrat 2017). Households possess diverse portfolios of livelihoods assets and they often have variant access to them. The livelihood strategies of the households are often dependent from the assets they have, and they often must make trade-offs with assets to have the best outcomes (Serrat 2017).

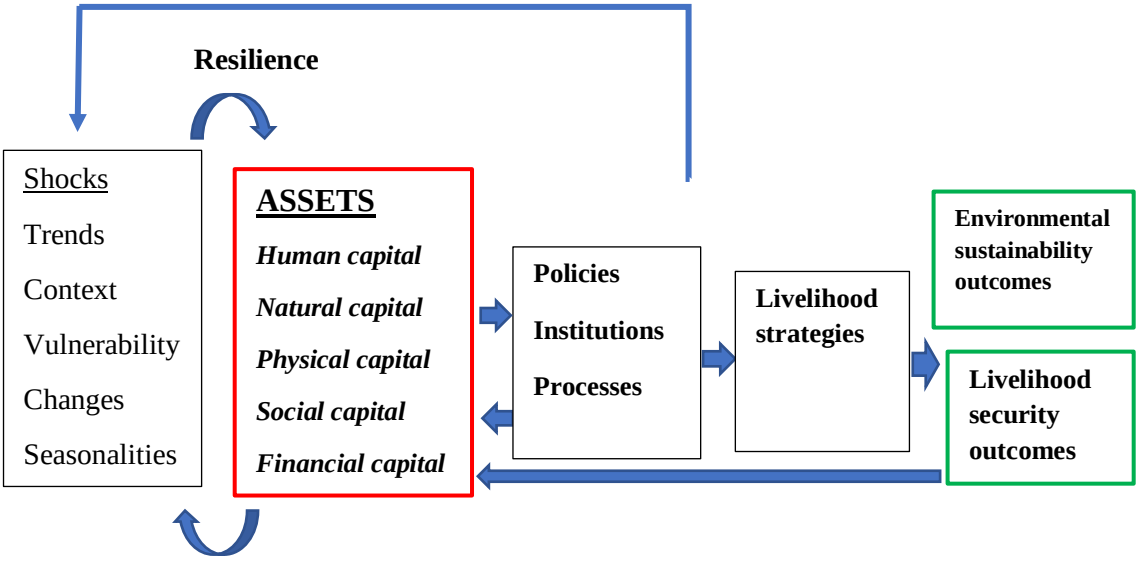

Figure 1. The Sustainable Livelihoods Framework (DFID 1999).

There are several factors affecting the livelihood assets of the poor households. The vulnerability context mean that households are vulnerable, for example, to different kinds of shocks, seasonalities, trends and changes. The shocks could be e.g. natural disasters, conflicts, diseases. Seasonalities could mean changes in prices, employment opportunities and so forth. Trends can be negative or positive and they can comprise e.g. demographic, environmental and economic trends. The households' resiliency is highly depended on the assets they have (Serrat 2017).

In addition to households' capital assets and potential vulnerabilities, also the various kinds of policies, processes and institutions affect the livelihoods strategies of the households. There are several institutions, which provide services, decide and implement different kind of policies. The institutions could be either public or private, such as a governments or non-governmental organizations. The processes are those varied laws, regulations, policies and practices, which institutions have set and implemented. The livelihood strategies and livelihood outcomes are highly dependent from the functionality of processes and how they support poor households. The policies and regulations could allow or prevent households' access to livelihood assets (Serrat 2017).

The livelihoods strategies of the rural households are often versatile. This is the result of the diversity of the households' capital assets and complex direct and indirect impacts of

processes. With different livelihood strategies households aim to have secure and best possible livelihood outcome. The households' objective is to increase their capital assets, for example get more income, improve food security and enhance the resilience to shocks and changes (Serrat 2017). Households' livelihood strategies affect to also to the environment sustainability outcomes. Households objective could be the sustainable use of natural resources, but the circumstances are not always favorable. The policies and regulations implemented by institutions can encourage households for sustainable use of natural resources with providing suitable incentives and by creating favorable conditions to sustainable livelihoods.

The livelihoods assessment is a very broad and complex topic to study, since there are so many things affecting the households' livelihood strategies and -outcomes. For example, it is difficult to assess the households social capital. It is difficult to perceive the people's complex social relationships, social statuses and memberships in groups in a short interview. Nevertheless, the households' level of social capital could have a great impact to livelihoods and wellbeing. Despite the livelihoods of the smallholders farmers are broad research topic the sustainable livelihood framework is useful to improve the understanding of the livelihoods of the farmers. In addition, the framework can clarify all the factors affecting the livelihood opportunities and, thus making it easier to plan the study and designing the questionnaires.

3. LITERATURE REVIEW

3.1 Livelihood diversification

Shifting cultivation has been widespread and traditional agricultural system in rural areas of Laos. The livelihoods of the smallholder farmers have mainly focused on subsistence farming of rice and other crops (Vongvisouk et al. 2014). The Government of Laos has regarded shifting cultivation as one of the reasons for deforestation and the aim is to restrict swidden agriculture by implementing new land use policies, such as Land and Forest Land Allocation (LFA) policy. The government encourages farmers to change shifting cultivation to more permanent and market-based crop cultivation (Vongvisouk et al. 2014). The changes in farmers cultivation systems have had impacts to households' livelihoods, land use and food security in rural areas. However, it is still somewhat unclear how the transition of cropping has affected to the people and the landscapes (Vongvisouk et al. 2014; Manlosa et al. 2019).

Livelihood strategies are diverse compilation of activities and assets which secure the survival and well-being of the household. Agriculture is often the main livelihood activity of the rural smallholders. Additionally, they have often complex portfolios of other income sources and activities (Ellis 2000; Martin and Lorenzen 2016). According to Ellis (2000) the diversification of livelihoods is a process, and there are many determinants how the households construct their livelihood portfolios. Diversification is either voluntary or involuntary. In some situations, it is necessity to diversify the livelihoods and sometimes households want to proactively seek alternative income sources. In Laos, rural smallholders diversify their livelihoods in many ways. It is common that some of the household members have either on-farm or off-farm job. Paid labor reduce the risk of agriculture and bring extra incomes to cope from the possible unexpected events (Martin and Lorenzen 2016). In addition, labor migration is important livelihood strategy for the smallholder households. The agricultural activities do not necessarily provide enough incomes for the family and due to this, families may diversify their livelihood portfolio with off-farm work. Often, the better educated household members migrate out from the rural village to urban center (Cole and Rigg 2019). The remittances from the family members could be a significant share of the households' cash incomes. The extra income

enables the households' investments to agriculture or to other more profitable livelihoods activities (Martin and Lorenzen 2016; Cole and Rigg 2019).

To reduce the vulnerability for the risks, and to maximize the incomes, the smallholder farmers improve their livelihoods with crop diversification in the farm. The smallholders in Laos have introduced cash crops in their farms to intensify their land use. Cultivation of cash crops could have positive impacts to households livelihoods, but it can have also negative impacts, especially for the food security (Vongvisouk et al. 2014; Manlosa et al. 2019). The incomes from the selling of cash crops could enable households to buy food from the markets, but cash crop farming could contain risks. The cultivation of cash crops could become unprofitable, because of the high volatility of selling prices (Vongvisouk et al. 2014).

3.2 Land use policies

3.2.1 Land-Use and Land Use Planning Programme (LUPLA)

In the early 1990s the government of Laos noticed that country's development was threatened by a "*chain of degradation*". The concerns arose from population growth, deforestation, soil erosion and swidden agriculture. To avoid this process, the government set new land use policies. Their objective was to achieve sustainable development by enhancing land use planning, allocating enough land for rural households and protecting watersheds from erosion (Lestrelin et al. 2012).

The government of Laos implemented Land-Use Planning and Land Allocation Programme (LUPLA). The main goals for the policy were to end the shifting cultivation and protect the forests. The forests in Laos were divided into five categories: "protection", "conservation", "regeneration" forests, "production" and "degraded" forests. People could collect NTFPs and do limited logging in production forests. Degraded forests can be used for agriculture, livestock grazing and tree plantations. LUPLA involved precise identification of the village boundaries, mapping the of village land and allocation of agricultural land for each household in the village (Lestrelin et al. 2012). In addition to

zoning and allocation of land, the government of Laos established 20 National Protected areas in the late 1990s (Lestrelin et al. 2012).

3.2.2 Turning land into capital

Laos is a country with low population density, and it relies heavily upon its natural resources for its economy. Laos is rich in natural resources, such as minerals, hydropower, timber and fertile soil (Kenney-Lazar 2012). At late 1990s the idea of turning land into capital gain ground, due to new development models (e.g. green neoliberalism) and growing demand from foreign private investors to gain access to land. Before the year 1997 the main goal of the land use planning (LUP) was to "rationalize" the existing land use, but now the government's aim was to find "empty space" to develop industries utilizing natural resources (Lestrelin et al. 2012). According to Kenney-Lazar (2012) most of the foreign investments flows in agribusiness, mining, tree plantations and hydropower projects.

In 1997 the government established the National Land Titling Process. The aim of this land use policy was to allocate secure land for investors and encourage investments into market-oriented land uses (Lestrelin et al. 2012). At first the land titling policy concerned only urban and peri-urban areas, but in mid 2000s policy was implemented also in rural areas. The aim of the government was to allocate under-utilized land for private investors, that they could convert land for more profitable plantations. This contributed the other policy objectives of stopping swidden agriculture, providing jobs for smallholders and aggregate remote villages closer to roads (Lestrelin et al. 2012).

The decision-making power over land use was decentralized to district and provincial administrations. The district officials could authorize land concessions up to 100 hectares and provincial administrations could allocate land leases up to 1000 hectares. Land concessions over 1000 hectares were authorized by the National Assembly (Lestrelin et al. 2012). However, decentralization of decision-making power did not work well. It was common provincial administrations leased thousands of hectares of land against the regulations (Lestrelin et al. 2012).

It can be contested how successful land leases for private investors have been for Laos. By leasing and allocation land for plantations and for infrastructure, Laos has attempted to boost their development and economic growth (Kenney-Lazar 2012). However, the revenues from land leases has been significantly low. In Laos, leasing rates per hectare/year have been from 3 to 9 USD, while the rates in neighboring countries have been from 30 to 70 USD per hectare/year (Kenney-Lazar 2012). Land concessions have often caused severe ecological and socio-economic impacts. Employment opportunities for local people have been weak and level of wages are often low (Lestrelin et al. 2012) In addition, large land concession could have negative impacts on smallholders' livelihoods. Smallholders dependent from subsistence farming and forest resources are in the most vulnerable position. If they lose their access to and control over land and resources, they have no other option than resettle or seek alternative income sources (Baird 2011).

In 2009 the land allocation policy was refined. The officials created clear guidelines how to benefit more from the land concessions. Their objective was to harmonize the price of land across the country by improving the filing, monitoring and reporting system. The new regulations took also account the suitability of land for planting industrial crops. The possible areas for land leases were classified based on their biophysical characteristics (Lestrelin et al. 2012). In the late 2009 The government of Laos also introduced a new Participatory Land Use Planning (PLUP) policy. The aim of the policy is to prevent land seizures, clarify the village boundaries by land zoning and allowing villagers to participate the land management planning (Lestrelin et al. 2012)

3.3 Land use changes in Laos

In 1982 forest cover in Laos was about 50%, thereafter deforestation rates were high. In 2010 forest cover was only 40% from the land area (Phompila et al. 2017). It is estimated that forest cover was approximately 57% in 2018 (Department of Forestry Ministry of Agriculture and Forestry, Lao PDR 2018). According to the World Bank, the forest cover percentage was 82% in Laos in 2016 (World Bank 2020). The definitions for forest cover are in many times diverse and this explain often the variation in forest cover percentages. The forests in Laos comprise primary- and secondary forests, plantations and bamboo

(Phompila et al. 2017) The aim of the Lao government is by the year 2020, forest cover has increased to 70 percent. According the government, this could be achieved by reforestation, afforestation and stopping the shifting cultivation (MAF 2005).

The transition from subsistence agriculture to more intensive monoculture cultivation modifies the land use and livelihoods (Phompila et al. 2017; Ornetsmüller et al. 2018; Hepp et al. 2019; Kallio et al. 2019). In Laos, smallholders and large agribusinesses are often adopting new cash crops due to high market demand and due to improved access to markets (Ornetsmüller et al. 2018; Hepp et al. 2019). For example, there were significant hybrid maize (*Zea mays*) boom in Laos, since there was a high demand for livestock fodder in neighboring countries (Ornetsmüller et al. 2018; Kallio et al. 2019). Adoption of cash crops increase in many cases the incomes and improve food security of the households. However, market demands are vulnerable to fluctuations and market prices can change rapidly. Decline of the market prices could impact negatively to smallholder farmers' livelihoods (Ornetsmüller et al. 2018; Kallio et al. 2019).

In addition, to the economic risks to households' monoculture cropping and intensified land use behavior, this practice is in many cases environmentally unsustainable. In Laos, annual cash crop production has caused deforestation, forest and land degradation. Farmers have expanded their cash crop fields into forested areas or in areas previously used for subsistence farming. (Vongvisouk et al. 2016; Ornetsmüller et al. 2018; Kallio et al. 2019). In the mid-1990s, the Government of Laos (GoL) implemented a new land use policy "The national Land and Forest Allocation" (LFA) program to develop agriculture, reduce poverty and protect the forests. The intention of the new policy was to limit land areas allocate limited areas to the households in order to end shifting cultivation (Vongvisouk et al. 2016). The reasons for the land use changes and deforestation are often highly complex processes, thus it is questionable if land reform is functioning. Land allocation could also create social inequity as poorer households get less land than richer households (Vongvisouk et al. 2016).

3.3.1 Expansion of teak plantations

Teak (*Tectona grandis*) is a native high-value tree species growing in natural forests in Southeast Asia, including Laos (Smith et al. 2017). Due to over-exploitation, natural teak forests are declining, but the area of planted teak is increasing. To prevent deforestation, the government of Laos has restricted logging in natural forests and prohibited exportation of logs (Pachas et al. 2019). According the national legislation, naturally growing teak is protected, and is considered as a 'special species' (Smith et al. 2017). The government of Laos has set policies to promote smallholder teak planting already in the 1980s. Potentially high value teak could increase smallholders on-farm incomes and thus reduce the poverty (Smith et al. 2017). Tree plantations can contribute the farmers livelihood transition from traditional shifting cultivation to a more commercial-based agriculture (Newby et al. 2014). Smallholders' adoption of teak growing could have also other benefits, such as increased forest cover and supply of sustainable timber for industry, both domestic and international markets (Smith et al. 2017).

Teak growing by smallholders has been widely adopted in Northern Laos, especially in province of Luang Prabang and villages near the city of Luang Prabang (Newby et al. 2014; Pachas et al. 2019). There was a large expansion of teak plantations in the 1990s and early 2000s, probably due to the improved road access, land allocation policies and market opportunities (Arvola et al. 2019; Pachas et al. 2019). However, according to Pachas et al. (2019) expansion rates of teak plantations declined after the boom of early 2000s, because of changed policies in land accessibility and incentives to plant teak.

There are no precise data what the total area of teak plantations in Laos is. It is estimated that there are approximately from 30,000 to 40,000 hectares of teak plantations in around Laos (Pachas et al. 2019). There are over 15000 hectares of teak plantations in Luang Prabang Province (Pachas et al. 2019). Newby et al. (2014) points out that plantations are owned by both smallholder farmers and urban landowners, either converting swidden land into tree plantations or buying properties. Many households are now growing teaks in woodlots or in agroforestry systems in northern Laos. Thus, farmers have been able to diversify their livelihood portfolios by including the teak growing (Newby et al. 2014).

However, there have been constraints in adoption of the teak growing and expansion of plantations by smallholders. Comparing the expansion of tree plantations with

neighboring countries, China and Vietnam, the success has been quite modest (Newby et al. 2014; Arvola et al. 2019). There are several reasons that affect the smallholders' land use decisions, such as growing of commercial tree crops. The smallholders' opportunities to establish and maintain teak woodlots are dependent on households' livelihood assets, livelihood strategies, access to markets and enabling policies (Newby et al. 2014).

According a recent case study by Arvola et al. (2019) several factors are affecting the success of teak growing by smallholders in northern Laos. Smallholders willingness to adopt tree growing and to extend their plantations are highly affected by national regulation, incentives and market condition.

The government has set policies to encourage smallholders to establish teak plantations. In the early 1990s, the Land and Forest Allocation Process (LFAP) was implemented (Smith et al. 2017). This policy allows households to get additional land from degraded areas for agricultural production and for tree growing. If a household establish a teak plantation in the land allocated through LFAP, they must pay land tax for three years after planting. If the plantation meets the specific requirements after three years, households could apply for permanent land use rights. After the tree plantations are formally registered, households get several incentives, such as tax exemptions and extensions services(Smith et al. 2017). Despite the incentives, land allocation process has not been so successful in encouraging farmers to register their plantations. According Smith et al. (2017) the level of land registration has remained low, approximately 10 percent of plantations are registered. Many of the farmers owning unregistered teak plantations regarded the benefits of registration unclear. Smith et al. (2017) point out, households owning small plantations found it disadvantageous to pay relatively high registration payment compared to annual land taxes.

According Arvola et al. (2019) reduced availability of additional land and growing interests of cash crop cultivation could reduce the smallholder's motivation to expand their plantations. To respond the land scarcity and to have more stable incomes, farmers have interests to intensify their land use with intercropping (Arvola et al. 2019). Good market conditions are essential for smallholders' motivation to grow teak. Absence of markets do not encourage farmers to grow species from which they do not get decent income, in which case, farmers try to find alternative crops to grow. Strong demand for high quality teak in Northern Laos keeps the price of wood relatively high. However, lack

of silvicultural management skills could lead to growing poor quality timber which decrease the value of wood. In addition, lack of market information and weak negotiation power could prevent smallholders to fully benefit from the wood sales (Arvola et al. 2019).

Figure 2. Teak and banana plantations by the road in Khanteung village, Nambak District, Lao PDR.

3.3.2 Rubber tree plantations in Northern Laos

Cultivation of rubber trees (*Hevea brasiliensis*) has expanded in Northern Laos over the past two decades (Manivong and Cramb 2008; Kenney-Lazar et al. 2018). The rapid expansion of rubber is a result of high global demand for latex and improved access to markets. Companies mostly from China, Vietnam and Thailand have invested in the rubber business in Laos. In the northern parts of Laos, the government has restricted granting of the large-scale land concessions for foreign investors and therefore contract farming of rubber is common between farmers and companies (Kenney-Lazar et al. 2018). The government's objective is to intensify land use and reduce the shifting

cultivation, but at the same time boost rural development and smallholders' livelihoods (Manivong and Cramb 2008; Kenney-Lazar et al. 2018).

According the Manivong and Cramb (2008) the cultivation of rubber by smallholders could be economically profitable and it may reduce the shifting cultivation in rural areas. To ensure the incomes from the rubber, the government's role is to provide incentives and create supportive conditions for the business. Despite the potential to alleviate poverty in rural areas, the production of rubber could also have negative social, environmental and economic impacts (Fox et al. 2014; Kenney-Lazar et al. 2018). The price fluctuations of rubber are high risk for smallholders' livelihoods if they are too dependent on incomes from rubber. In addition, diminished shifting land used for subsistence agriculture could have negative impacts on households' food security.

Kenney-Lazar et al. (2018) points out that plantations could reduce the biodiversity and carbon sequestration by trees if forests are largely replaced by rubber trees. Also, there are severe social and environmental risks in large-scale rubber plantations established by the companies. Foreign investments to large-scale rubber plantations could displace the local communities, reduce their farming land or access to NTFPs (Kenney-Lazar et al. 2018). According to Fox et al. (2014) large-scale rubber plantations could have negative impact on soils and watersheds. For example, the overuse of chemical fertilizers, herbicides and pesticides in plantation areas can contaminate surface- and groundwater, which puts local people at risk.

Figure 3. Smallholder's small-scale rubber plantation in Nambak district, Lao PDR.

3.3.3 Household-level forest transition pathways

Newby et al. (2014) separate three main forest transition pathways that households often follow in Northern Laos. The most relevant pathways are the "economic development" pathway, "smallholder intensification" pathway and "state forest policy" pathway. Considering the differences of households' socioeconomic statuses, there are a diverse range of livelihood strategies. There are generally inequalities on how households can manage their land, and which crops they can grow. Therefore, households choose different pathways to secure their food sufficiency and incomes. Land use transitions are influenced by complex relationships of policies, households' socioeconomic characteristics and environment (Newby et al. 2014). These different pathways are not linear or smooth, they can change for several reasons, for instance a household experiencing a livelihood shock (e.g. sudden demand for cash or illness).

Those who follow the "**economic development**" pathways have enough land to integrate teak into their farms with little negative impact to their food security and incomes. However, they often have limited labor availability and their silvicultural management skills are often poor. Those households who follow the "**tree-based smallholder intensification**" usually have limited access to paddy and river gardens. They often have diverse crop production to provide stable income flow. Households can allocate labor to different land types such as to rice fields and gardens. Teak woodlots and agroforestry systems (*intercropping teak with cash crops and NTFPs*) are usually established in steep slopes and uplands to use land more efficiently. Those following the "**state forest policy**" pathway have often less land and they make trade-offs with short-term income and long-term benefits that could be achieved by growing teak. Since it takes time for trees to reach maturity, households are often forced to rent some additional land to continue their rice and cash crop growing. Scarcity of suitable land could drive households search for cropland from other regions. (Newby et al. 2014).

Some of the households with little land resources fail in forest transition and they may be forced to sell their lands. This could bring notable benefits to well-off households that are able to purchase new land parcels. After losing the land, poor households do not have a possibility to grow trees and they grow only food crops, such as upland rice. Reduced access to upland plots and declining yields due to short fallow periods could force people to search for off-farm jobs (Newby et al. 2014).

3.4 Smallholder farmers' forest dependency

Laos has high forest cover and forests are rich in biodiversity. Rural dwellers utilize many forest products daily, with non-timber forests products (NTFPs) being important for national and household-level economies (Openshaw and Trethewie 2006; Boissière et al. 2014). NTFPs play a significant role in smallholders' livelihoods. The dependency from environmental products often depends on the wealth of the household, with richer households usually less dependent on the forest products. Annual incomes from NTFPs can comprise a great part of a households' total income. It is estimated that an average of 40%–50% of annual household cash incomes came from non-timber forest products in rural Laos (Openshaw and Trethewie 2006). Forests provide many kinds of products for

sale and for subsistence. Forest are important “safety nets” for the poor households for coping with shocks, such as crop yield loss. Some of the NTFPs have high economic value and the over harvesting of species has caused forest degradation (Castella et al. 2013).

Decreased availability of high value species has led to domestication of NTFPs by farmers in rural villages. The most commonly domesticated species in Laos are: paper mulberry (*Broussonetia papyrifera*), cardamom (*Amomum spp*.), broom grass (*Thysanolaema maxima*), bamboo (multiple species) and peuak meuak (*Boehmeria malabarica*)(Castella et al. 2013; Boissière et al. 2014). Boissière et al. (2014) point out that there is potential to benefit more from NTFPs with marketing and processing the products, whereas currently most of the NTFPs are exported unprocessed from Laos, because of lack of capacity to refine the raw materials.

Nowadays, the improved market access in many villages has increased the local people’s interest to collect high value NTFPs to sell (Castella et al. 2013). The improved road connections to the villages have enabled high volume sale of the products to middlemen and, while domesticated NTFPs have become important income sources for many smallholder households in rural areas in Laos (Castella et al. 2013).

Figure 4. Domesticated galangal and broom grass crops in Nambak District, Lao PDR.

Figure 5. Harvested paper mulberry (*Broussonetia papyrifera*) for sale in Khanteung village, Nambak District, Laos.

Figure 6. Different kinds of forest products collected by farmers in Nambak District, Laos.

3.5 Household shock-coping strategies

Rural households with limited livelihood assets and lack of opportunities to diversify their livelihood strategies, are vulnerable to various types of shocks (Nguyen et al. 2018). Shocks may have a great impact on households' livelihoods, since the access to formal insurance institutions and safety nets are often poor (Wagstaff and Lindelow 2014). Households in rural areas are commonly exposed to shocks, such as economic-, health-, sociopolitical shocks and natural and biological hazards (Wagstaff and Lindelow 2014). Smallholders could face e.g. a weather-related crop failure, due to severe drought or flood. In addition, crop yields can decline, due to pest infestation or fungal diseases. Household members could face also deaths, injuries and severe illnesses. Also, various market failures are common (Wagstaff and Lindelow 2014). These kinds of shocks have different

impacts on households' livelihoods and wellbeing, depending of vulnerability of families (Wagstaff and Lindelow 2014). The definition of the vulnerability is "*the ability of people or social groupings to recover from, adapt to, respond to and cope with any external stress placed on people livelihoods. Vulnerability is an indication of peoples' ability to cope with the impacts resulting from external trends, shocks, and stresses*" (Kelly and Adger 2000). Whereas, resilience is the ability of people to cope with or respond to shocks (Ingxay et al. 2015). The livelihood assets of household influence the selection of shock-coping strategies. Households with many livelihood assets have better chances to adapt and recover from the shocks (Wagstaff and Lindelow 2014).

Rural smallholders are often dependent on forest- and aquatic resources to cope with unexpected events (Nguyen et al. 2018). If the households face, for example, severe crop failures, they can utilize resources from the forests to cope with the shock. Commonly households collect NTFPs to improve their food security or to get additional income by selling the products (Ingxay et al. 2015). Typical products collected from the forests are e.g. various kinds of fruits, nuts, mushrooms and bamboo shoots (Ingxay et al. 2015). In addition, smallholders extract also timber from the forests (Nguyen et al. 2018). NTFPs are often extracted from near the villages and trees are logged from more distant forests (Nguyen et al. 2018). To cope with shocks, rural households tend also sell their livestock assets or do extra casual off-farm work (Ingxay et al. 2015). Access to additional jobs could nevertheless be difficult for rural people in Laos to access, since they have often low education level and they might lack suitable skills (Ingxay et al. 2015).

According to a study by Wagstaff and Lindelow (2014), the most common coping strategies for households in Laos are to use savings, borrowing, receiving help from the community and, selling their assets. Following a severe shock, households could be forced to reduce their consumption and spending (Wagstaff and Lindelow 2014). Getting financial support from the government or from the non-governmental organizations (NGOs) are fairly uncommon in developing countries. Government and NGOs have provided some assistance occasionally, when households have been exposed to some weather-related crop failure or in the case of a death (Wagstaff and Lindelow 2014).

The absence of formal safety nets in rural areas in Laos hampers the poor households to cope with and adapt to shocks. When the households must cope with unexpected expenditures, they often resort to informal network finance (Akihiko and Chaleunsinh

2015). To cope with shocks, households generally use their own cash savings or sell their assets. In addition, households could get assistance from their relatives, friends and other family members (Akihiko and Chaleunsinh 2015).

Households could borrow money or use credit to get food, such as rice and sometimes food and money are received as a gift. The gift exchange is often based on reciprocity in the social network (Akihiko and Chaleunsinh 2015). As Akihiko and Chaleunsinh (2015) point out, pure gift giving is more common within family where the role of reciprocity is less significant. However, the efficacy of network finance and the accessibility of it by rural households can be weak. The people who form such informal networks in rural areas usually share a similar social class and risks. Therefore, smallholders' potential to provide monetary- or food assistance to other households is often difficult (Akihiko and Chaleunsinh 2015).

4. COUNTRY PROFILE OF LAO PDR

4.1 General information on Lao PDR

Lao People's Democratic Republic (Lao PDR) is landlocked country (Figure 7.) which covers 236,800 km^2 (World bank 2018g) in Southeast Asia, surrounded by five neighbor countries, Vietnam, China, Thailand, Myanmar and Cambodia. The total population in 2018 was approximately seven million people (World Bank 2018a) and around 65% of the population lives in rural areas (World Bank 2018b). Laos is mostly mountainous, covering about 70 percent of the land area (Clarke 2008). The highest point of the Laos is Phu Bia (2817 meters) with a mean elevation of 710 meters. Mountains are commonly covered with dense forests (CIA 2019).

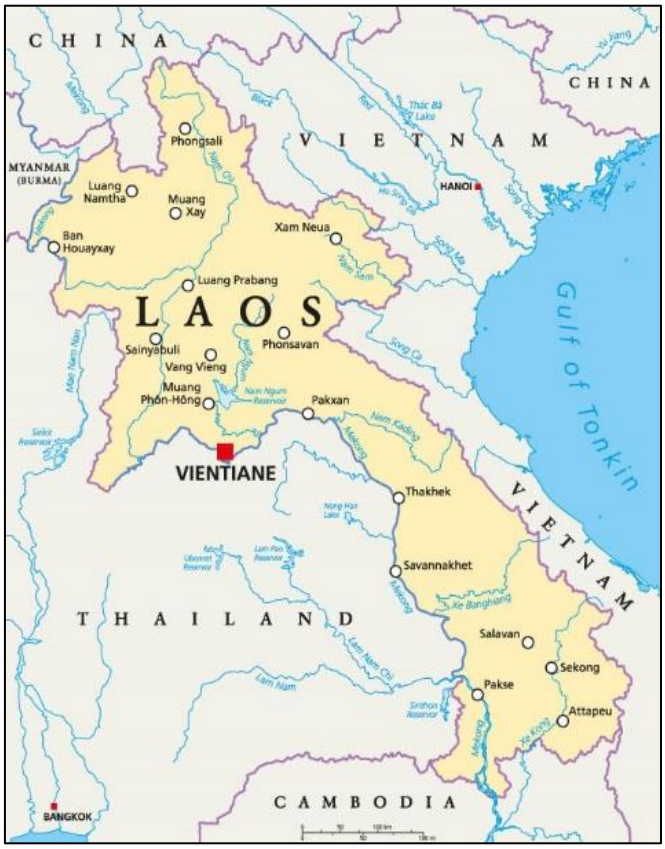

Figure 7. Map of Laos (Geographical 2019).

Lao PDR has a tropical monsoon climate. The climate can be divided into rainy season, from (May to October) and a dry season, (from November to April). The average annual rainfall is approximately 1300–3000 mm. Average temperatures in mountain areas and plateaus are 20 degrees Celsius and in the plains about 25–27 degrees Celsius (UNDP 2019).

The capital city of the Lao PDR is Vientiane which lies by the river Mekong, opposite to the Thai border. The Mekong River is the biggest river in the Southeast Asia. The river provides important transport route and food for the people (Phompila et al. 2017). Laos consists from 17 provinces. Large population centers are formed in fertile river plains. The most populous provinces are Vientiane, Savannakhet, and Champasack (UNFPA 2015). In 2018, 35% of the people lived in urban areas and 65 percent lived in rural areas (FAO 2018). Annual urban population growth in 2018 was approximately 3.4 percent (World Bank 2018j).

The government of Laos has recognized 49 ethnic groups and four major linguistic groups in the country. The largest linguistic group is Lao-Tai, approximately 62% of the population (UNFPA 2015). The main ethnic groups are the Lao 53%, the Khmou 11% and the Hmong 9% (Lao Statistics Bureau 2016). Buddhism is the most popular religion, with approximately 65% of the population Buddhist. Approximately 31% of the population have no official religion, but many of these people practice animism, which is still widely practiced in rural areas (Lao Statistics Bureau 2016).

4.1.1 Economy and Development

Lao PDR is one of the least developed countries (LDC). According to the United Nations LDCs are “low-income countries confronting severe structural impediments to sustainable development. They are highly vulnerable to economic and environmental shocks and have low levels of human assets” (The United Nations 2018). Despite this, Lao PDR has managed to alleviate poverty in recent decades and poverty rates have declined from 46% to 23% in by 2015 (UNDP 2018). In addition, Laos has made progress in reducing hunger and improving the health and education sectors. Yet, there are severe problems especially with malnutrition of children and maternity mortality (World Bank.

2018). Lao PDR ranks 139th out of 189 countries in UNDP's Human Development Index (UNDP 2018b).

In the year 2018 the GDP of Lao PDR was 17.954 billion US dollars (World Bank 2018h) and the annual GDP growth was approximately 6.9%. The average GDP growth has been 7.8% over a decade which makes Lao PDR one of the fastest growing economies in Asia (World Bank 2018,2018c). The economy of the Lao PDR is highly driven by natural resources such as forestry, agriculture, hydropower and minerals. The fast-economic growth is based on exporting natural resources and increasing foreign direct investments in natural resource exploitation (UNDP 2018, OECD 2014). Agriculture and forestry products accounted for 8.6% of all exports in Lao PDR in 2016 (OECD 2017).

Laos has set some development goals for ten-year socio-economic development strategy (2016-2025). The overall objective for development "is to ensure political stability, peace and order in the society; the poverty of the people is reduced significantly in all areas; the country is developed out of LDC status by 2020 through continuous, inclusive and sustainable growth; there is effective management and efficient utilization of natural resources; development is enhanced through the national potential and advantages; Lao PDR participates in regional and international integration with ownership" (The 8th Five-Year National Socio-economic Development Plan (2016–2020) 2016).

The benefits of economic growth are not distributed evenly within the country. Poverty and income disparities are common. Especially, income disparities are widespread in rural areas where most of the population are dependent on agriculture and forest resources (OECD 2014). The economic growth has concentrated elsewhere in the region and economy sector (OECD 2014). Unsustainable use of natural resources and direct foreign investments to land could have negative impacts to rural livelihoods and to low-income households (OECD 2014).

4.1.2 Forests in Laos

According to Clarke (2008) there are nine different forest types in Laos: Dry evergreen forest, tropical montane evergreen forest, lowland semi-evergreen dipterocarp forest, tropical montane deciduous forest, dry dipterocarp forest, mixed deciduous forest, forest on limestone, pine forest and sub-tropical montane forest.

Forests are classified in to three categories by the forest law. ***Protection forests*** are forests which are for the protection of watersheds, environment and soil protection. ***Conservation forests*** are for protecting and conserving animal and plant species and their habitats. These areas protect also valuable historical and cultural places. ***Production forests*** provide timber and other forest resources for national economic and for livelihoods of the people and to achieve the development goals. These forests should be utilized without significant negative environmental impacts (MAF 2005).

In total there are 3.2 million hectares of production forests in Laos (MAF 2005). According to the World Bank the total forest area of Lao PDR was 189,505 km^2 in the year 2016 (2018i). The latest official forest estimation suggests that the total forest area is 132,000 km^2, which is 57.4% of total land area in 2015, if forest is defined as an area with minimum of 20% canopy density, stand diameter is 10 cm at breast height (DBH) and with a minimum area of 0.5 ha (Department of Forestry Ministry of Agriculture and Forestry, Lao PDR 2018). Agricultural land is estimated to be 23690 km^2 in the year 2015 (World Bank 2018e) which is approximately 10.3% of total land area (World Bank 2018d), about 6.6% of the total land area is classified as arable land (World Bank 2018f). Without clear boundaries of production forests, and without proper management planning forest quality has deteriorated. The fragmentation of forests has increased, forest densities have decreased. In addition, large trees have decreased in the forest areas, while forests containing only small diameter trees have increased (MAF 2005).

Timber is also extracted also from other areas than production forests. Timber and forest resources are coming from areas converted to other uses for example when new infrastructure is built. Increasing demand for timber are also causing illegal logging in protection forests (MAF 2005). In 2016 there were approximately 440,000 hectares of tree plantations in Laos (The 8th Five-Year National Socio-economic Development Plan (2016–2020) 2016).

5. DATA AND METHODS

5.1 Overview

The data gathering methods were the same in each of the three study villages. Primary data were collected with one key informant interview with the village head, two separate focus group discussions (one with male and one with female participants), a village transect walk and 30 household interviews. The key informant interviews were arranged first, since the village head was able to provide the household lists and arrange for the villagers to attend the focus group discussions. The focus group discussions and transect walks were carried out after the key informant interviews. After the focus group discussions, the household interviews were conducted with randomly selected households in each of the study villages. The study methods, data analysis and the characteristics of the research villages are described more precisely in section 5.3.

5.2 Study area

The study was conducted in Nambak district, Luang Prabang province. The district covers an area of 1936 km^2 and is located approximately 100 kilometers to the northeast from the provincial capital city of Luang Prabang. The paved provincial road goes all the way to the Nambak district center. Most of the villages are established in the river valleys, since the district is characterized by hilly upland and karst mountains. The landscape in the villages is characterized by paddy fields, shifting and fallow land on hill slopes, teak woodlots and large- and small-scale rubber plantations. Most of the houses in the villages were made from cement, wood or bamboo. The infrastructure is relatively poor in many villages, however there has been a lot of improvements concerning the road-, water-, and electricity access in the past 10 years.

Nambak district (Figure 8.) was selected as the study area since it was known in advance that land use and livelihoods in the area are changing in many ways. There has been

widespread boom of teak and rubber growing in Luang Prabang province, mainly because of high demand of these products. In addition, the Chinese owned large-scale plantations have a great influence on people's livelihoods and environment. The other reason for the selection of study area was, that the University of Helsinki has cooperation partners in Souphanouvong University in Luang Prabang. Due to this, it was easier to organize the field work and get the research permits.

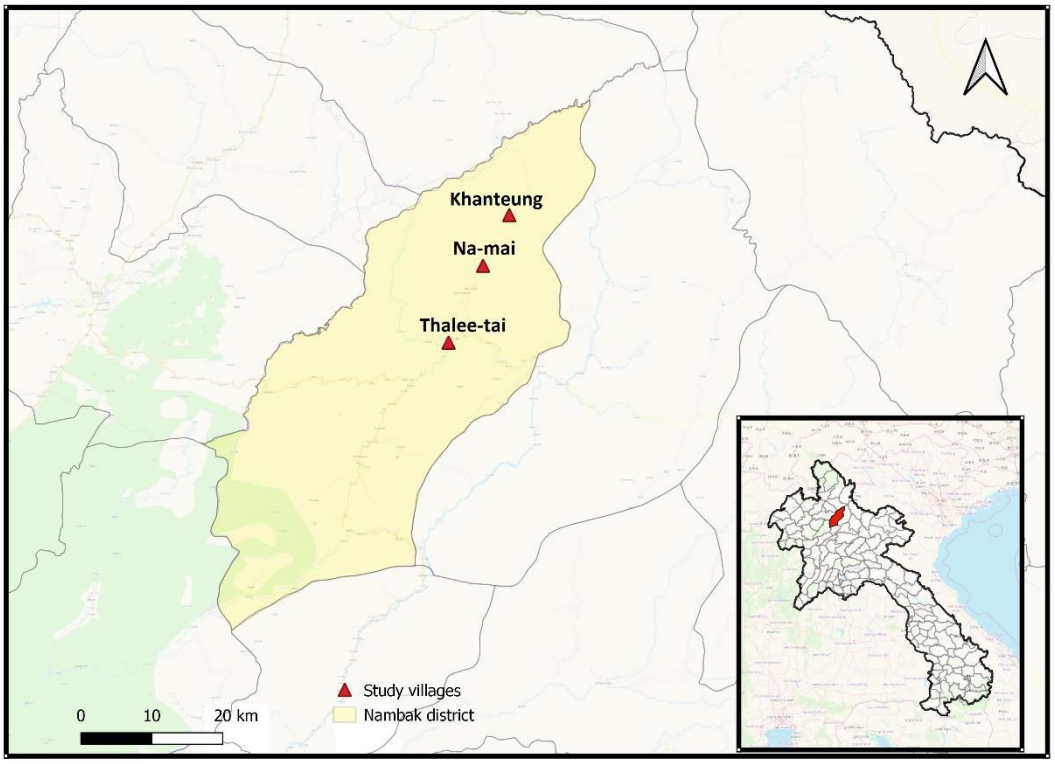

Figure 8. Map of the research area and locations of the study villages in Nambak District, Luang Prabang Province.

5.2.1 Selection of the study villages

The objective of the village selection was to have a comprehensive view of changes in livelihoods and current trends in land use in the pre-selected Nambak district. Due to the limited time frame and financial resources the aim was to select three different villages that fulfill certain criteria; The first selection criteria considered the remoteness and accessibility of the villages:

1) Village 1: Good access (roads), close to big market or town, more off-farm income activities
2) Village 2: Medium in terms of access, development, natural forest cover.
3) Village 3: Remote, poor access, undeveloped, more natural forest and 'traditional' livelihoods.

The three villages selected included also some of, or a combination of, the following criteria.

1) Large-scale or intensive agricultural activities (maize, biofuel & other cash crops, etc.)
2) Different kinds of smallholder tree management systems (woodlots, fallows, and agroforestry systems). At least one site with some teak woodlots, 1 site with swidden/shifting land, maybe rubber.
3) Significant changes in the livelihood activities of the households
4) Ethnicity: The three villages should have the same ethnic composition, not 100% the same, but almost.

On the 11th of November the research group visited in District Agriculture and Forestry Office (DAFO) in Phonsa-ard village in Nambak to get initial information about the villages within the district. The discussion with the local officials was informative and they gave advice where to find villages that meet the criteria. There are 86 villages in total in Nambak district. The potential study villages were located to the north from Nambak on the same gravel/sand road. We used a car to visit the potential villages and conducted rapid rural appraisals (RRA) using the semi-structured interviews with a key informant. The purpose of the RRA is to collect basic information from a wide range of villages to help with the selection of the study villages. The information acquired during the RRAs mainly considered the most important livelihoods, cultivated crops and the composition of the ethnic groups. In addition, we asked for the possibility to have accommodation and meals in the village during the data gathering.

After the appraisals of the villages, the three villages that met our criteria the best, were Thalee-tai, Na-mai and Khantheung (see Figure 8). The first village, Thalee-tai, was

selected because its proximity to the business and administrative centre of Nambak. It is located next to the main road and the infrastructure in the area is fairly developed. Most of the people are Khmus and their main livelihood activity is farming, but people have also off-farm jobs. The second village, Na-mai, is approximately 15 kilometres from Nambak administrative centre and is medium in terms of access. The main livelihood activities are farming and cultivation of cash crops.

The composition of the ethnicities in Na-mai was a bit different than other study villages. Approximately 60% of the inhabitants were Khmus and 40% Lao Loums. However, the different ethnic groups were living in separate sub-villages within the village, so we accepted it as one of our study villages. The third village, Khanteung, was the most remote village of the three. It is approximately 25 kilometres from Nambak, and accessibility is quite poor due to gravel road which is in relatively bad condition.

People get most of the incomes from farming and from domesticated NTFPs. Most of the people in Khanteung are Khmus. Especially, the further villages, Na-mai and Khanteung were surrounded by shifting land and different types of forest. After the selection of the study villages, we had to get a research permit from the head of the DAFO. On the 13th of November 2019 we obtained the research permit "official letter" from the DAFO and we were allowed start the data gathering.

5.2.2 Village descriptions

5.2.2.1 Thalee-tai

Thalee-tai village (*GPS Coordinates N 20.62562°, E 102.45854°. Elevation 329m*) was founded in 1980 right next to two other villages: Fa and Phonsa-ard. The cluster of these villages forms the Nambak district business and administrative centre. The main market areas are in Phonsa-ard and Fa. The morning market in Phonsa-ard is located 800 meters away from Thalee-tai and the evening market in Fa is located only 300 meters away. The area is relatively developed, there are plenty of shops, roadside restaurants, guesthouses and other economic activities. The village is approximately 120 kilometers to the north

of the provincial capital, Luang Prabang. Thalee-tai is established by a small river that merges with the larger Nambak River, which flows near the village.

The main district road passing the village was already built in 1945. Nowadays the paved road is in relatively good condition. The village road was built in 1986. It is a gravel road which has advantages and disadvantages to the village dwellers. The road makes life easier, but on the other hand, during the dry season people are exposed to road dust, which has harmful health effects. The village got electricity in 1990 and nowadays all the households have access to electricity. Today, people have mobile connection and access to internet in the area. The wealth of the people has increased in the village and they can spend more money to build new houses and to buy new commodities. The village has water supply connection from the neighboring villages. Since 2005 people have used mostly bottled water for drinking, because tap water is impure. The inhabitants of Thalee-tai have good access to health services, since there is a hospital in the neighboring Phonsa-ard village.

The village has 167 households and the population is 1072. According the interviewed people, the population of the village is increasing. That has caused problems with land availability. Nowadays the village is lacking suitable agricultural and residential land. According to the key informant, in the past ten years, approximately 15 hectares of forest area has been cleared for agriculture cropland to cultivate upland rice and vegetables.

The main ethnic groups are Khmus and Lao loums. Altogether 90% of the people are Khmus, with rest of the people Lao loum. The livelihoods of the inhabitants are mostly related to agriculture. The main sources of agricultural incomes are paddy rice, livestock and vegetables. In addition, some people have off-farm jobs, such as shop keepers, civil servants and plantation workers. A Chinese company has leased some land from the village to produce rubber and the company offers some temporary work for the villagers. People in the village are cultivating mainly paddy rice and many kinds of vegetables for subsistence. The farmers in Thalee-tai and Phonsa-ard share an irrigation system for their paddy rice fields. Increasingly, smallholder farmers are changing from subsistence farming to cash crop cultivation and tree growing. Most of the small woodlots in the village are owned by the households. The main tree species grown in the village are teak, rubber and rosewood.

5.2.2.2 Na-mai

Na-mai village *(GPS Coordinates N 20.72942°, E 102.50500°. Elevation 395m)* was founded in 2004. It is located approximately 14 kilometers to the north from the Phonsa ard village. The village is medium in terms of access and development comparing the other study villages. The main road from Phonsa-ard village through the Na-mai was built in 2006. The gravel road bypassing the village was improved in 2011 and the road was in a relatively good condition. According the villagers, the road has improved the market access, but also increased traffic accidents rates. The funding for the road improvement was provided 50% by the Lao government and 50% by Power Construction Corporation of China (ChinaPower). The Chinese company is building a cascade of hydroelectric power plants on nearby Nam Ou River. The dam construction site is situated to the north from the village and the trucks are transporting the building material along the road.

The population of the village is 1274 and there are 246 households. Nowadays, the population is increasing. There is some migration from neighboring villages to Na-mai. The main ethnic groups are Khmus (60% of the population), and Lao loums (40% of the population). The different ethnicities live in different areas in the village, with Khmus living in the southern side of the village and Lao loums in the northern side.

The power grid was built in 2006 and currently every household has electricity 24 hours per day. Electricity has made the life easier for the people. Today, the families have lighting and televisions in their houses, but the daily food is still cooked mainly over an open fire. The village water supply system was built in 2006. There have been some improvements in the water supply system in 2019. The funding was shared by the villagers and Lao Red Cross. The Lao Red Cross has also provided funding to build new toilets for the households. According the villagers, the toilets have also downsides; they attract more mosquitos and therefore malaria infections have increased. The water taps are mostly shared with the neighbor households. The tap water is mainly used for cooking and washing. Generally, the people in the village drink bottled water. Every week a salesman comes to the village to sell plastic water bottles with 20 liters volume.

The primary school was built in 2007 and it was renovated in 2011. The renovation of the school was financed by the villagers and some private company. There is no hospital in

the village, but people have access to health clinic in the neighboring village. The mobile connection has been available since 2011 and internet connection since 2015.

According the villagers there have been significant changes in livelihoods. Subsistence farming has increasingly changed to cash crop cultivation. The main crops are now: rubber, galangal, cardamom and broom grass. Especially, the cultivation of upland rice has decreased. Farmers get more incomes from the cash crops compared to upland rice. Other benefit is that there is less weeding work during the growth cycle of cash crops. The main crops for subsistence are different kinds of vegetables and upland rice. There is also a paddy field in the village, where water is pumped from the river during the cropping season. The most important livestock for sale and for subsistence are chickens and ducks. Nowadays, keeping the pigs in the district is decreased due to spread of infection disease.

Some of the households in the village have small woodlots. The main species are teak, rubber and rosewood. Currently there is high demand for rubber in China, therefore farmers are interested to grow rubber trees. Approximately once per week the middlemen comes to the village to get the latex from the farmers. There are also Chinese company owned rubber plantations and one large-scale watermelon plantation. The companies have provided temporary work for the villagers, such as weeding and harvesting jobs. According to the local people, the plantations were established in fallow land. However, there has been some deforestation in the village. In the past 10 years, approximately 20 hectares of forest has been cleared for cropland mainly to grow upland rice.

5.2.2.3 Khanteung

Khanteung *(GPS Coordinates N 20.79789°, E 102.54042°. Elevation 466m)* is the most remote of the study villages. It is located approximately 25 kilometers to north from the Phonsa-ard village. Khanteung was founded in 2000. The population of the village is 847 and the number of households is 154. The population is increasing, since there is in-migration of people from the neighboring Phongsaly province. The people in the village are mostly Khmus by their ethnicity, with only two households being Lao loum ethnicity.

The main road passing the village is gravel road and it was built in 2006, with improvements made to the road in 2017. The funding for the road improvement came

from the Lao government and from the Chinese power company. The electrical grid was built in 2006 and nowadays each household have electricity in their houses 24 hours per day. The primary school was built in 2005 and after that, it is renovated in 2015 with support of a Non-governmental organization. The village has water supply system, which was built in 2010 with support of Laos poverty reduction fund. Thereafter in 2014 the Lao Red Cross has provided support to improve the water supply system and sanitation facilities. Usually, the bottled water is used for drinking in the village, but some of the households drink boiled tap water. The mobile connection has been available for the villagers since 2009. The wireless network signal is very weak in the village area, therefore the access to internet is poor.

The main livelihood of the people in the village is agriculture. In the past, farming was mainly for subsistence, but recently there has been shift from subsistence farming towards cash crop cultivation. The main cash crops cultivated in the village are rubber, broom grass, cardamom, galangal and job's tear. Farmers are mainly cultivating upland rice and different kind of vegetables for subsistence. The main livestock farmed by the households for cash and subsistence are chickens, ducks and pigs.

A Chinese company has a 100-hectare rubber plantation in the village. The company has also hired some villagers to work temporarily in the plantation. In addition, there are also household owned rubber and teak plantations in the village. Farmers own approximately 10–20 hectares of rubber plantations and about 5 hectares of teak woodlots. According to the key informant interview there has been some land pressure on agricultural land. Some of the villagers have rented land for the companies and now some of the households are lacking cropping land. According the village leader, approximately 15 hectares of forest has been cleared for cropping land and for rubber plantations in the past 10 years. There have also been some conflicts between neighbors in farmed shifting land. The borders of the land plots are often unclear, and this causes confusion in farming. To clarify and support the equitable use of land areas, The Agro-Biodiversity Initiative (TABI) has done forestry and agriculture land use planning in Khanteung village. The program has made accurate mapping from the forests and land use of the village. The main objective of the program is to alleviate poverty and improve the livelihoods of farmers through the sustainable management and use of agro-biodiversity in village landscapes.

5.3 Data collection and methods

The data for the study were collected as primary data. It is original data which has been collected specially for this study. The quantitative and qualitative data were collected with interviewing household members and key informants in the study areas. The interviews were conducted by two local research assistants which were hired and trained in advance (see Section 5.3.3.3). The interviews were made face to face between the researchers and interviewees. The researcher has a translator speaking Lao language in every interview occasion.

Three interviewing method were used to gather comprehensive information from the study topic. In this study, the interview methods utilized were key informant interviews, focus group discussions and household interviews. In addition, village transect walks were used as observational study method. The combination of these different methods enhances the credibility of the study by triangulation of data.

Designing the questions to household surveys and planning the focus group discussion are important in qualitative research. In this study, semi-structural interview method was used. The questionnaires consist open-ended semi-structural questions, but also some structural questions. In qualitative research, the questions are often planned beforehand, but they can be modified later in the field if problems occur. Also, additional questions could be asked if extra information are needed (Alasuutari 1999).

5.3.1 Key informant interviews

The objective of key informant interviews (KIIs) is to carefully select a few individuals which could provide the information of the studied subject (Kumar 1989). The key informants do not often represent the typical respondent in the survey. The key informants usually have a special role in the community, and they have depth knowledge and experience. (Kumar 1989). The advantages of the key informant interviews are cheapness and interviews are relatively quick way to collect information (Kumar 1989).

In this study the knowledge of the key informants is based on their high position in the community (village heads). The village heads were interviewed face to face with the help of the research assistants. The objective was to gather precise information about the main characteristics of the studied villages. The interviews provided information about the villages' inhabitants, infrastructure, main livelihoods and land use. During the interview the interviewer took notes to a questionnaire sheet to analyze answers afterwards (The key informant questionnaire is presented in Annex 3).

Figure 9. The key informant interview with the village head in Na-mai village.

5.3.2 Focus group discussions

Focus group discussion (FGD) is a qualitative research method where group of people discuss a given topic with the lead of a moderator (Nyumba,et al. 2018). The objective of a researcher is to collect qualitative data related to a specific study topic. In addition, the researcher could observe group dynamic and non-verbal behavior (Nyumba,et al. 2018). The size of a group may vary, but it is general that there are six to eight respondents in a discussion (Krueger & Casey 2000). With over 12 people a group could become too

difficult to manage (Nyumba,et al. 2018). There are some different opinions what kind of composition of participants is best (Krueger 1994, Thomas et al., 1995). Krueger (1994) points out that respondents should be quite similar with their social background, age and gender. Similar characteristics could improve the engagement of the group and thus, generate useful data. The duration of the discussions should be approximately 1–2 hours. If the event is longer than that, participants could lose their focus on discussion (Nyumba,et al. 2018).

In this study focus group discussion was selected since, it is cost-effective, and it is easy way to get an overview of the issues studied. The researcher assistant led the discussion as a moderator and the other assistant took notes. The aim was to get data from the main income sources, and how have they changed over time. In addition, discussions concerned the changes in landscapes in the village area.

It is important to consider the cultural aspects in group discussions and in mixed gender groups there is a risk of biases, hence, in this study, men and women were divided in separate groups to get a more accurate data. Men are often the heads of the household and they can be more dominant in discussions while women remain silent. Of course, many kinds of biases are common in any group setting and it is advisable to consider possible biases in the data collection phase (Nyumba,et al. 2018). Nyumba et al. (2018) point out a few biases which are common in group discussion. Dominance effect (where dominant person could shape discussion), halo effect (status of a participant could influence the discussion) and groupthink (group of participants think similarly to maintain group cohesion).

Focus group discussions were arranged altogether six times in this study. Two separate groups with different gender were arranged in each of the three study villages. The time for the focus group discussions was arranged with the village heads. The villagers were informed by the village head to come in the meeting at the certain moment in time. The number of participants in the focus group discussions varied from 9 to 18 people. The objective was to engage participants with diverse age and profession composition. Most of the participants in the discussions were farmers, but there were also a few shop keepers. In Khanteung the youngest participant was 18 years old and the oldest was 66 years old. The average age of the participants was 39 years. In Na-mai the youngest participant was 22 years old and the oldest was 72 years old. The average age of the participants in Na-

mai was 35 years. In Thalee-tai the youngest participant was 26 years old and the oldest was 60 years old. The average age of the participants in Thalee-tai was 45 years. Topics discussed in the FGDs where similar in each group and questions were planned beforehand.

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Figure 10. Focus group discussions in Khanteung village.

5.3.3 Household surveys

The objective of household survey is to have relevant and comprehensive information from households' livelihood strategies, land use and land use changes in the research villages. **A household** is defined as "*a social unit composed of those living together in the same house. The persons who live only a part of the year in the same dwelling are also included to a same household*."

5.3.3.1 Selection of the households

In this study, all of the 90 sample households were randomly selected. The village leaders had the updated lists of all the households in the study villages. The lists also contained information about the household's ethnicities. This was important, since the study focused only on one ethnic group. According the village leaders, there were people from two ethnic groups living in each of the study villages, Khmus and Lao Loums. The target

ethnic group in this research was Khmus. It is common that different ethnic groups have different statuses in the villages and the livelihoods can be substantially different. This was the reasons for selection only one ethnic group per village to the study.

All the households with Khmu ethnicity were numbered from the lists. After that, random number generator (Gigacalculator.com) was used to select 35 households from the lists in every study villages. Altogether 30 sample households were included in the study. In case that some households are hindered and cannot be interviewed, altogether 5 additional households were selected in each village.

5.3.3.2 Designing the questionnaire

The aim of the household surveys is to have data from households' assets and land ownership. Surveys provide also information from the households' livelihood changes, the shocks they have experienced and coping strategies with the possible changes and shocks.

The research is mixed method study where both quantitative and qualitative data is collected. The questionnaire contains both semi-structured open-ended questions and structured questions (See Annex 1).

5.3.3.3 Training of the research assistants and testing the questionnaires

Two local research assistants were trained for a total of nine days. The research assistants were Laotians and they speak the local language The objective of the training was to ensure that the assistants understand all the questions and they can conduct the interviews in Lao language. The other aim of the training was to emphasize the importance of good quality and accurate data filled in the questionnaires. The notes in questionnaires should be comprehensive and usable in data analysis. In addition, some instructions about research ethics were included to the training. For example, it is important to ask agreement from the respondents to taking part in the study. The assistants translated also

the most parts of the questionnaires in Lao language to ensure the good flow in discussions.

The household survey questionnaire were tested with six households, which were not included to the study samples. The testing households were randomly selected in the first research village Thalee-tai. The household survey questionnaire was modified and revised in total five times before the final version was ready.

The questions in key informant interviews and focus group discussion were not tested apart from the study. The questions and the tables of key informant interview (KII) were modified after the interview in our first study village Thalee-tai. The focus group discussion with a group of men in Thalee-tai village was the first chance to test the questions. This was also an opportunity for the research assistants to practice discussion leading and taking good quality notes. Some of the questions and the tables of the focus group discussion were modified after the first discussion. Due to the research assistants' low level of experience in conducting interviews and group discussions there were some confusion in first occasions.

5.3.3.4 Execution of the household interviews

Altogether 90 households were interviewed in this study. A total of 30 randomly selected households in each of the study villages were interviewed by the two research assistants. The household interviews were conducted in the houses of interviewees. All the household interviews were conducted between 20th of November and 7th of December 2019. The average interview time was 82 minutes. The shortest interview lasted 34 minutes and longest interview lasted 165 min. The average size of the households was 4.8 people. Altogether 48% of the people in households were male and 52% were female.

All the interview responses were documented directly to the paper questionnaires. Notes were written in Lao or in English. Notes in Lao were translated into English after the interviews. To ensure smooth interaction with the interviewees, all the interviews were conducted in similar way. The interviewers followed the question order of the household questionnaire. In the end of the interview, the households were offered some snacks or soymilk to thank them for the time they spent to provide us the important information.

All the completed questionnaires were checked after the interviews to ensure that there was no confusing or missing data.

5.3.4 Transect walk

A transect walk is a participatory tool for gathering data from e.g. land use, distribution of resources, livelihood activities and the state of environment (Lorenzo and Motau 2014). It can be conducted for example with local smallholder group. Usually transect walk is made along a predetermined route in the village area. The route should preferably cover the main land uses and resources in the area (FAO 2011a, p.40). It is important that local people understand the objectives of a transect walk. A researcher can facilitate the discussion by asking specific questions from smallholders and make observations from the livelihoods and land use (FAO 2011a). It is advisable to carry a pen and a notebook to write down the most important observations. It is possible to interview people along the way to have a more precise information and other perspectives (FAO 2011a). After the walk the researcher could draw a diagram on a paper which illustrates the main crops, livestock, land use and possible problems in the village area (FAO 2011a).

In this study, the main objective of the transect walks was to gather information from the main livelihood activities, land use, most important NTFPs, main crops and livestock species in the village. In addition, the aim was to observe the villages' characteristics, such as infrastructure and housing. The transect walk is an important tool in this study for triangulating the research data that is collected with interviews.

5.4 Data analysis

Both quantitative and qualitative analysis methods were used in this study. The different kinds of data can complement each other. Most of the data collected were qualitative. Especially, the data gathered from the key informant interviews and from the focus group discussion were analyzed with qualitative methods. The qualitative data gathered with three different method increased the reliability of the study by enabling cross-checking

of the data and gaining comprehensive information from the phenomena in the study villages. All the data from the interviews, excluding data from the KIIs, were entered into Excel spreadsheets. Content analysis method was used to examine the similarities and the differences from the data collected with open-ended questions. Most of the quantitative data from the household interviews were categorized into a more manageable categories and then coded in the quantitative form.

In this study, the quantitative analysis methods enabled calculations of distributions, means and standard deviations from the data. Univariate analysis was used to analyze the distributions to explain the particular acts of the households or phenomena in the villages. The means and standard deviations were calculated mostly from the households' characteristics. All of the calculations and diagrams were made with Microsoft Excel.

6. RESULTS

Table 1. Geographic and demographic information of the three study villages in 2019.

Villages	Thalee-tai	Na-mai	Khanteung
Distance to main market (Nambak) (km)	1	14	25
Elevation (m)	329	395	466
Total population	1072	1274	847
No. of households	167	246	154
Average household size	5.2±2.0	4.7±1.6	4.6±1.4
Average age of the household's head	51±11.2	49±13.7	49±11.7
Household's head is a farmer (%)	80	97	90
Household's head is married (%)	87	93	87
At least one member in household with a university level completed (%)	23	0	0
Average size of the residential area owned by the households (ha)	0.23±0.62	0.04±0.034	0.05±0.063
Average land holdings (ha/HH)	2.24±1.99	1.94±1.57	2.67±1.68
Household have home garden (%)	43	43	37
Ethnic groups	Khmus & Lao loums	Khmus & Lao loums	Khmus & Lao loums

6.1 Livelihoods

Increased private- and the government investment in Nambak district has created more business opportunities and activities among the smallholder. The main changes in the area has been the improved road access, funded by the Chinese power company and the Lao government, access to electricity and new mobile phone- and internet connection. In addition, the non-governmental organizations, such as Lao Red Cross has had a major role in supporting the new water supply systems and improvements in sanitation in the villages. The general development in the area can be seen also from the new primary schools built and improved access to health services by the people. The new services available can support the households to enhance their livelihoods. Improved access to

healthcare and education have potential to increase the farmers' human capital asset. Additionally, the more diverse job opportunities, access to markets and market information will improve the opportunities of the smallholders to achieve more secure livelihood outcomes.

In this study, the households were asked to rank the three most important changes in their household during the past 10 years. The answers were very similar in each of the study villages. Distinctly, the most important change in every village was electricity access. More than 80% of the households in each of the villages thought that electricity is one of the most important changes in their household. Another of the most important changes were new- or renovated house and mobile phone- and internet access. In Thalee-tai, the new water supply system and the shift from drinking natural water to bottled water were important for the households. Whereas, in Na-mai and in Khanteung villages the new toilets were one of the most important changes in the households' lives. In addition, as much as 43% of the households in Khanteung thought that a new television is one of the most important change in their lives.

6.1.1 Land tenure security in the study villages

Altogether 98% of the people thought they had secure land tenure. The households that only own residential land often have to rent, share or borrow extra land to do cropping. These households think that they have unsecure land tenure. They cannot be sure that they can continue the cropping in the future in same land plots. A total of 34% of the households have acquired extra land for cropping in the past ten years. Altogether 77% of the acquired land was rented and 23% of the land was borrowed or shared. Most of the rented or borrowed land plots were shifting land. The farmers who shared the cropping land have often made an agreement with the landowner. Usually the landowner gets some share of the harvested crop. In most cases the households acquired the extra land to cultivate paddy rice, upland rice and vegetables. In Thalee-tai the most common purpose of the extra land acquired by the households was for cultivation of paddy rice, whereas in Na-mai and in Khanteung the most common purpose was to cultivate upland rice.

6.1.2 Changes in crop production

One of the main objectives of the study was to examine if there were any changes in smallholder farmers livelihood strategies over the past 10 years. Another objective was, – was to determine what are the impacts of the implemented land use policies and the high demand of cash crops to farmer's crop production. In Thalee-tai, altogether 53% of the households have made changes in their crop production in the last 10 years. As much as 80% of the households have made changes in cropping in the most remote, Khanteung village. However, only 33% of the households in Na-mai have made changes in their crop production over the past 10 years.

As can been seen from figures 11, 12 and 13 the households have clearly increased the cultivation of high valued cash crops. This indicates that there is high demand for particular products in the area. In every study villages the cultivation of domesticated NTFPs, such as broom grass, cardamom and galangal cultivation has increased. Also, the growing of trees has increased. Especially, in Thalee-tai, the households are more willing to grow trees, such as rubber, teak and rosewood. In addition, the smallholders in Na-mai and Khanteung villages has also introduced rubber on their farms. In the most remote village Khanteung, altogether 21% of the households have started to grow teak over the past 10 years. Many of the respondents said that they have decreased the cultivation of upland rice and replaced it with more valuable crops. Also, some of the households have changed upland rice farming to paddy rice.

The study examined also the impacts of the crop changes to the households' livelihoods. Altogether 55% of the households which have made changes in their cropping thought that they get more income now. Altogether 22% of the respondents thought that they need to work less, mainly because new crops introduced require less weeding compared the weeding of upland rice. Seventeen percent of the households said that they now get more both food and income. Only 2% of the households said that changes in cropping has caused more work than before.

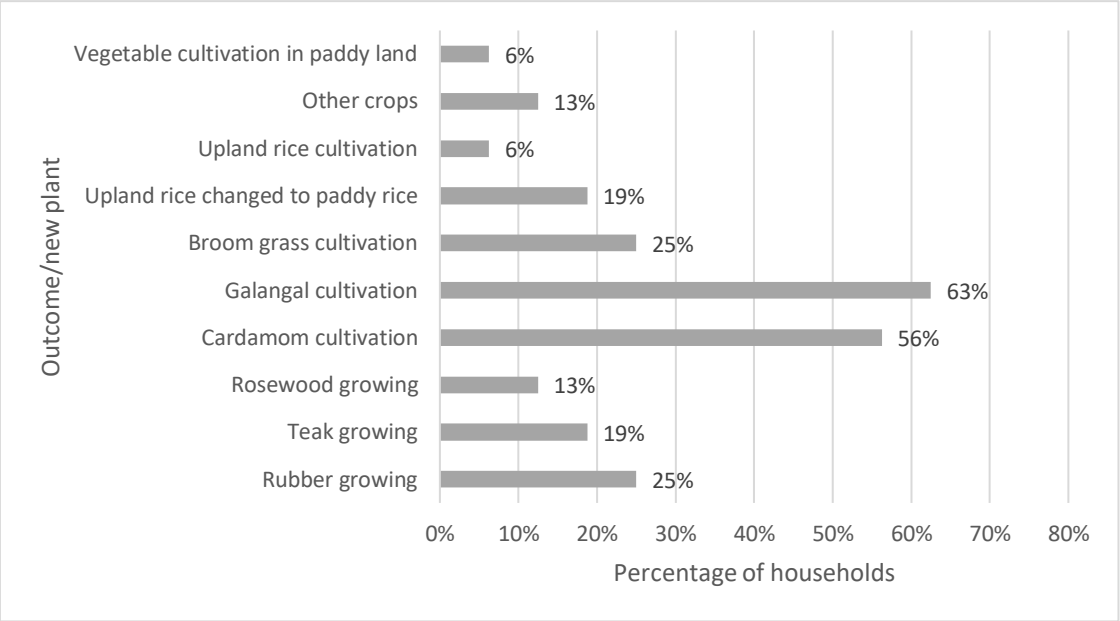

Figure 11. Changes in cropping by the smallholders in Thalee-tai village in the last 10 years.

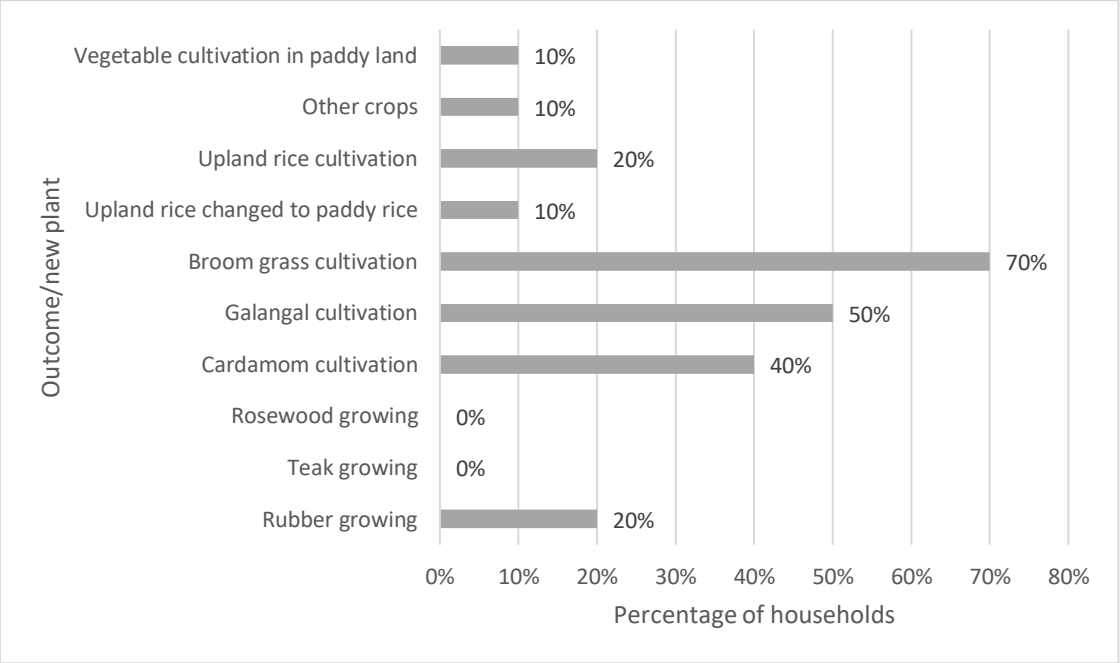

Figure 12. Changes in cropping by the smallholders in Na-mai village in the last 10 years.

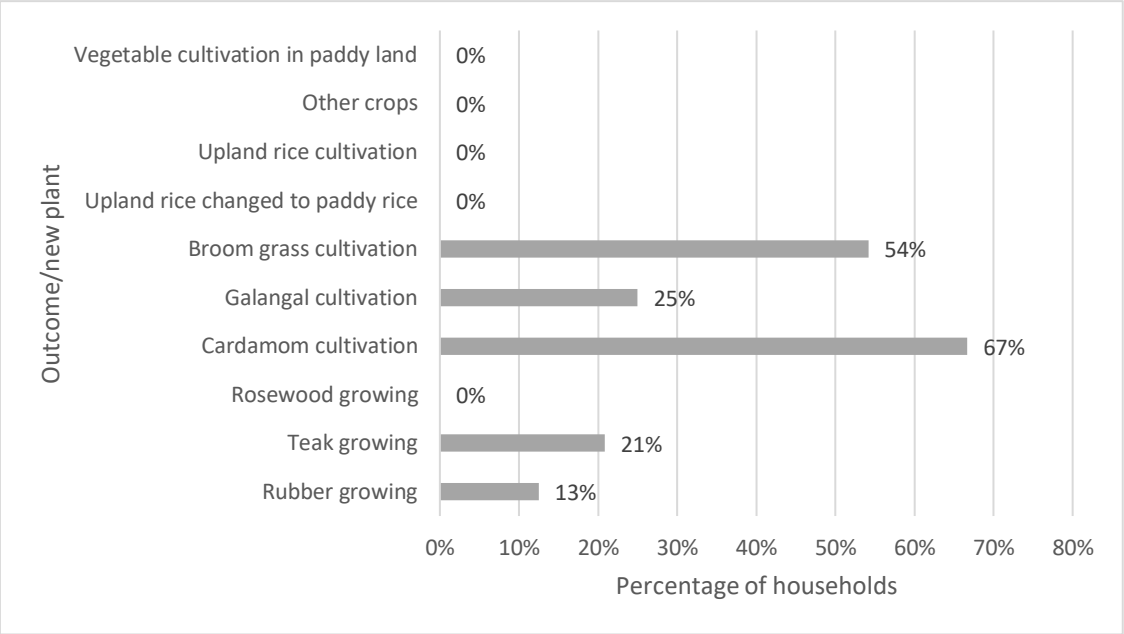

Figure 13. Changes in cropping by the smallholders in Khanteung village in the last 10 years.

According to the households, 85% of the crop production changes had a positive impact to the households' livelihoods. A total of 15% of the crop production changes had a neutral impact and none of the changes had only negative impacts to the household's lives. Most of the households thought that their overall workload has decreased. In Thalee-tai, as much as 77% of the households said their workload has decreases, whereas 20% of the households thought that the workload has increased. In Na-mai, 53% of the households thought that the overall workload has decreased, whereas 37% of the households thought the opposite. 10% of the respondents thought that there was no change in workload. Up to 83% of the respondents in Khanteung thought the workload has decreased and only 13 % said that the workload has increased. In Thalee-tai, 23% of the households have hired external labor over the past 12 months. Whereas, In Na-mai, only 3% of the households have hired labor and in Khanteung, the percentage was 27%. The most common work to hire external labor were planting of rice, weeding of upland rice and harvesting of rice.

Figure 14. Cardamom and wild taro drying in the sun in Khanteung village, Nambak District, Lao PDR.

The households usage of fertilizers, such as chemical fertilizers or animal manure was low in the study villages. The land use policies to restrict shifting cultivation by the farmers could have also negative impacts to agriculture and food security. The shifting cultivation land has diminished in the rural villages, since the government has restrained the land allocation for this form of agriculture. The shorter length of the fallow periods in shifting land and intensive monoculture farming could decrease the soil fertility in the future. In addition, the intense rains typical in tropics could cause a severe soil erosion in shifting cultivation areas on hill slopes. Although, the government has allocated land plots to households in upland areas, there have been disputes between neighbors in the villages. The boundaries of the plots are somewhat unclear, and the conflicts have concerned the planting of the crops in neighbors' land plots.

The other change in crop production in the study area concerned the intensified use of paddy lands. In the study villages, paddy rice is grown during the rainy season in the river valley. Before, the paddy land was left to fallow over the dry season, but nowadays after the harvest of rice, the land is replanted with, for example corn, tobacco, watermelon and other vegetables. The intensification of land use can improve the food security and

increase the incomes of the households. But on the other hand, without fertilizing the soil this can lead to soil degradation in the long term.

Figure 15. Paddy- and shifting land in Khanteung village, in Nambak district.

6.1.3 Changes in households' overall income-levels

In this study, the households were asked about the changes in their overall income-levels over the past 10 years. The income-levels have increased in most of the households. Altogether 87% of the households in Thalee-tai and in Khanteung, and 80% in Na-mai thought that their incomes have increased. In Na-mai, 20% of the respondents thought that the incomes have decreased. In Thalee-tai, the percentage of the households which said the incomes have decreased were only 7% and in Khanteung only 3%. The rest of the households though that there are no significant changes in the household's overall income-level over the past 10 years.

The study also examined the most important reasons for the changes in households' overall income-levels. As can been seen from Figure 16, there are some differences in comparing the study villages but there are also some clear trends of the reasons for changes in incomes. The wage income of the households has increased in each of the study villages. Many of the households in Na-mai and in Khanteung nowadays receive more salary from plantation work in Chinese owned large-scale plantations. Whereas, in Thalee-tai people get more wage commonly from working as soldiers or as civil servants. In addition, the households in the study villages get more incomes from selling of cash crops, such as cardamom, paper mulberry, galangal and broom grass. For example, 27% of the households in Thalee-tai thought their incomes have increased due to the increased sale of cash crops. In Na-mai and in Khanteung, the cultivation of upland rice is still common, and their income from selling surplus upland rice have increased in some households in the past 10 years. Another important reason for changes in income-level was increased access to casual work in construction. At least in Thalee-tai and in Na-mai, many of the household's male members worked occasionally in constructions especially after the paddy rice harvest.

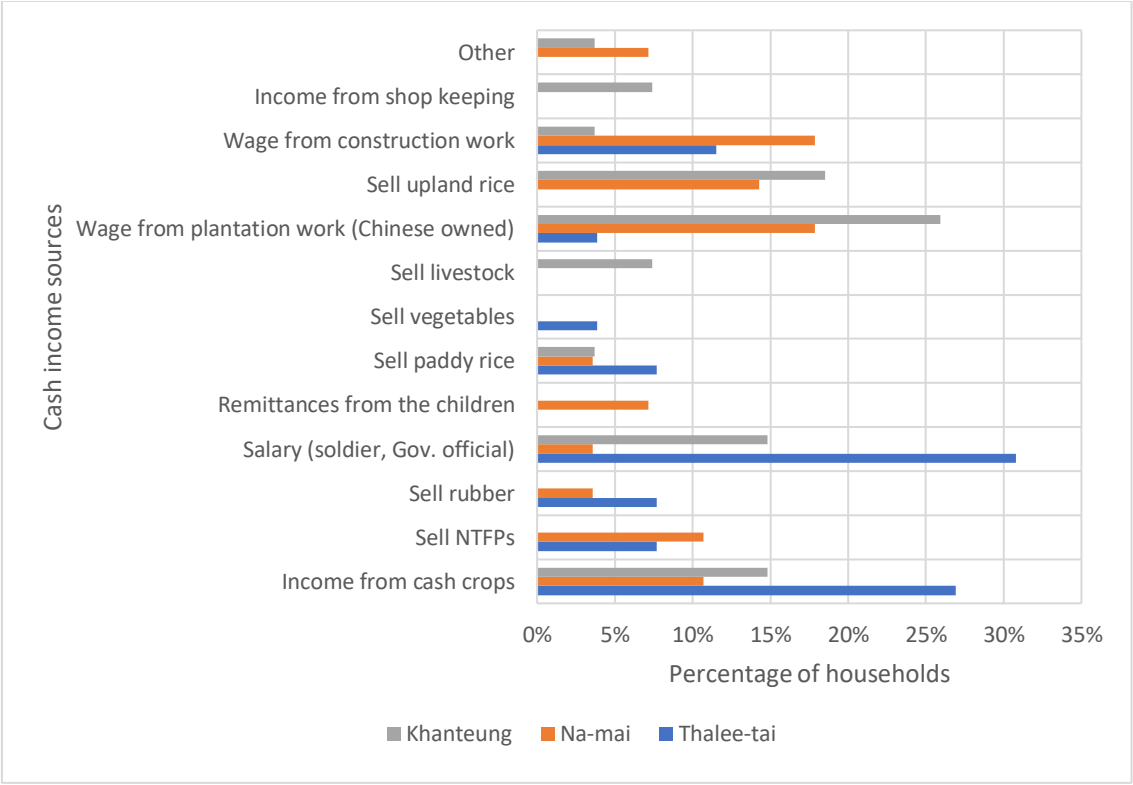

Figure 16. The most important reasons for the households' changes in overall income-levels in the study villages.

6.1.4 Households' main income sources

To study the households most important cash income sources, the households were asked to rank the five most important income sources over the past 12 months. All of the households listed only four main cash income sources. The cash income sources were categorized into eight different income groups: crop, NTFPs, non-forest wild products, timber, livestock, wage, business and other off-farm income. The 'other off-farm income' were in all cases remittance from children or other relatives working in various sectors. There were problems in categorizing crop- and NTFPs income, since the many of the non-timber forest products have been domesticated. In many cases households included, for example, broom grass, galangal and cardamom as either crop income or NTFPs income. In many times it can be difficult to distinguish whether or not they are cultivated or are growing naturally in forest. This can cause slight ambiguity to the results, but the trends in results are quite clear.

Wage income was ranked as being the most important cash income source by households in each of the study villages. In the most urban village, Thalee-tai, 53% of the households said the wage income is the most important income source. In Na-mai, this figure, was 40% of the households, and in Khanteung 47% of the respondents said that wage income was the most important income source in the past 12 months. The cash income from the crop selling was the second most important income source in every study village. The incomes from crop and from NTFP sales are very important for the households in Na-mai and Khanteung.

As can been seen from figures 17, 18 and 19, there are slight differences in ranking of main cash income sources between the study villages. The figures indicate that there are more business opportunities, such as shop keeping in Thalee-tai and Khanteung villages. According to the households, especially the incomes from wage, crop- and NTFPs sale has increased over the past ten years. The households' cash income from livestock are relatively low in all villages. The main livestock raised by the households were chickens and ducks. The pigs are decreased in the study area because of an infection disease. In addition, there are quite a few large livestock, such as cattle and buffalos in the area. Many of the households sell poultry, but mainly the poultry is used for subsistence and the total cash incomes from the livestock stay low.

It is important to note that foreign investments in large-scale plantations in the region provide job opportunities to local farmers, with wage income becoming an important part of increasing the financial capital of poor households. With higher incomes, households can engage in more capital-intensive livelihood strategies and their possibilities to diversify their livelihood strategies improve.

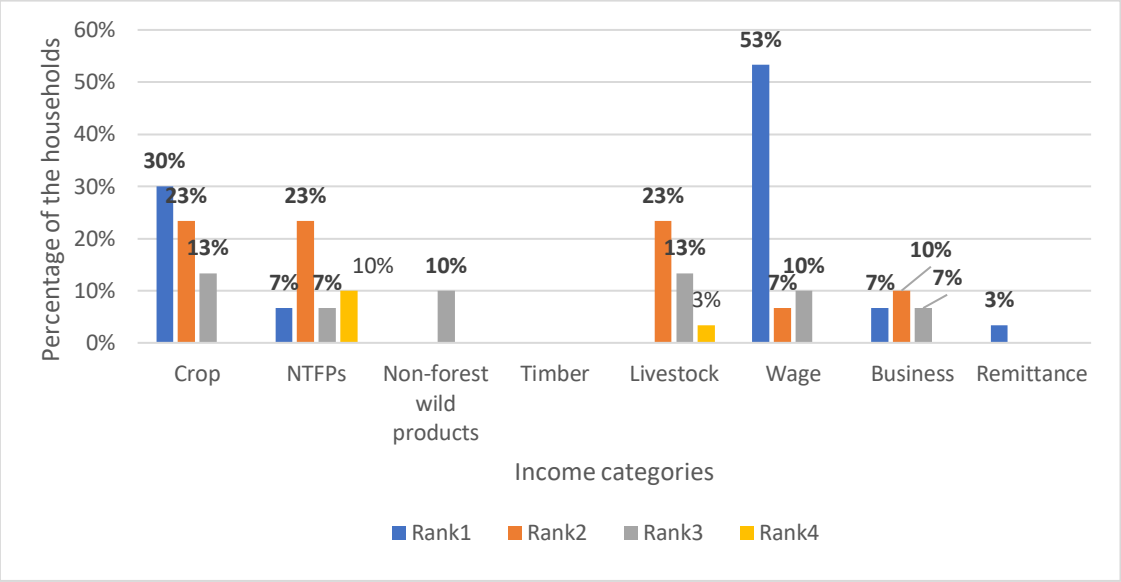

Figure 17. Main cash income sources ranked in Thalee-tai village.

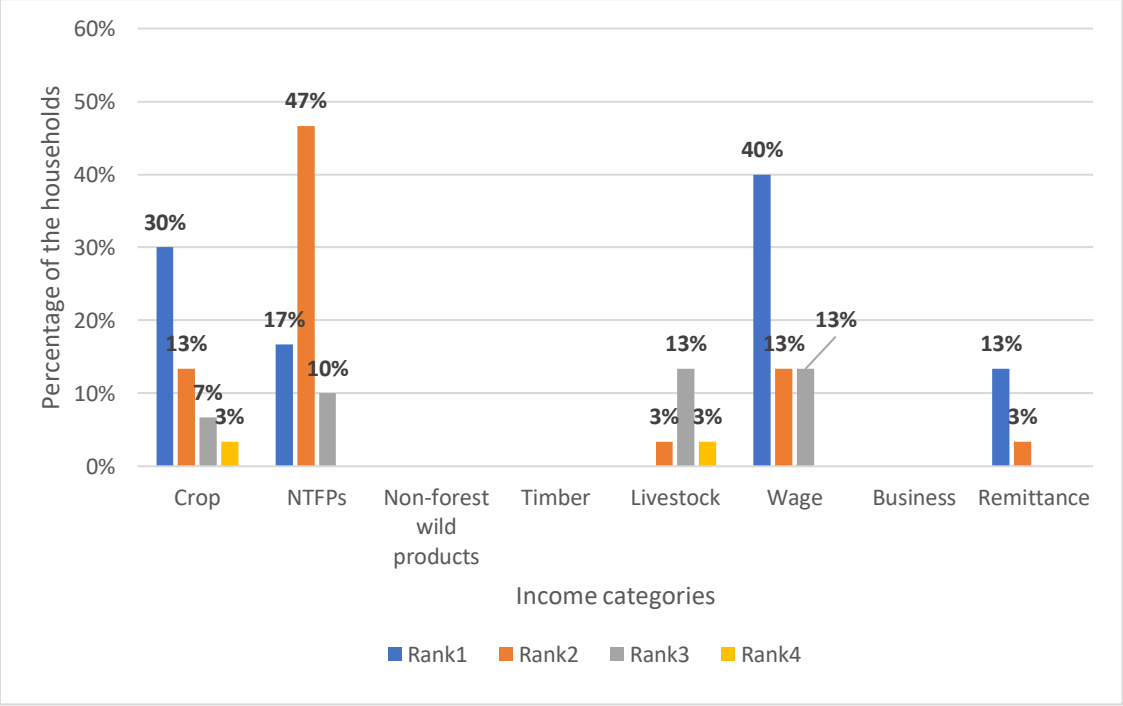

Figure 18. Main cash income sources ranked in Na-mai village.

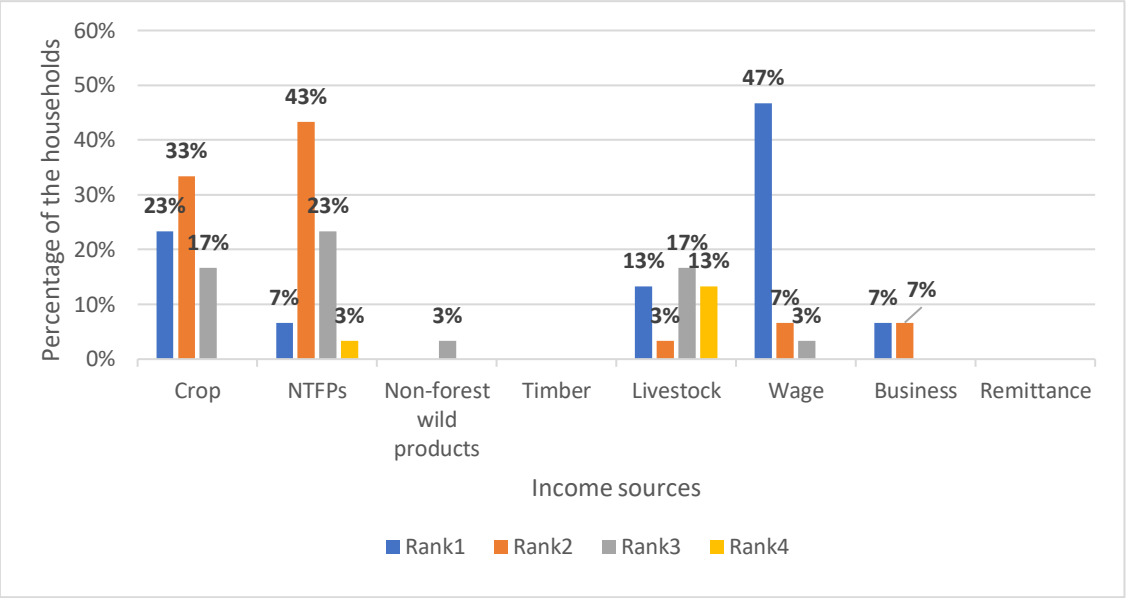

Figure 19. Main cash income sources ranked in Khanteung village.

6.1.5 Food security

In this study, the assessment of the households' food security was based on the rice they produced. Households were asked do they have enough rice – grown by themselves – to feed the family in the last 12 months. The households in the more remote villages Na-mai and Khanteung are self-sufficient considering the rice production. In Khanteung, altogether 90% of the households said that they were food secured and 70% of the households were food secured in Na-mai. The households were not so dependent on subsistence rice in the most urban village of Thalee-tai. Many of the households were able to buy rice from the markets. According to the respondents, the most critical months considering the food security were August, September and October. In every year, the paddy rice is harvested by the farmers approximately at the end of the October. Many of the households have already consumed all their rice from last year's yield before the harvest.

To cope with the occasional food shortages, the most common strategy was to buy compensatory food from the markets. All of the households that suffered from food shortages bought food. Most households (74%) were also collecting more forest or wild food products for home consumption to cope. Approximately 48% of the households that

suffered from food shortages also reported collecting forest products for selling. In addition, some of the households bartered food with friends and relatives.

6.2 Forest cover changes in the study villages

In this study four different forest types were examined in the villages. The forest types were production forests, protection forests, conservation forests and cultural forest areas. There were no national protected areas in the study area. The information about the state of the forests were collected mainly via key informant interviews and focus group discussions. In addition, questions were asked in the household questionnaires about their forest clearance and tree planting activities over the past 10 years.

The results clearly indicated that there was deforestation in every study villages. In Thalee-tai the estimated forest clearance over the past 10 years was approximately 15 hectares. The forests were mainly cleared for agricultural land to cultivate upland rice and vegetables. In Na-mai village the estimated forest area cleared was about 20 hectares. The reason for forest clearance was same as in Thalee-tai. Forest areas were converted to shifting agriculture land, mainly to cultivate upland rice. In Khanteung, the estimated forest area cleared was approximately 15 hectares. The forest areas were cleared for agricultural land and for rubber plantations.

The estimations of total forest areas cleared in the villages were made by the head of the villages. Since, the assessment of total cleared forest area could be difficult, and the information was provided only one person, the estimation of deforestation rates are not necessarily accurate. In addition, there is no exact information which type of forests were cleared, but mostly the tree clearance were made in fallow shifting land and in production forests. According to the household surveys, the clearance of fallows are common. Over the past 10 years, the respondents in the most urban village of Thalee-tai have cleared approximately 17 hectares of fallow, whereas the same number was nearly 30 hectares in Na-mai. In Khanteung, the fallow area cleared by the farmers was over 40 hectares.

According to the key informant interviews there has been some forests policy changes in the study area over the past 10 years. Mainly the new regulations consider the tree cutting. There are chance to cut trees from the production forests for domestic use in the villages.

The regulation to tree harvesting are strong and the households need a permission from the District Agriculture and Forestry Office (DAFO) to cut trees from the production forests. The new guidelines permit selective cutting of trees for example for housebuilding by poor households. However, the application documents to DAFO must be precise and justifiable. At least in Na-mai village the production forests areas were degraded, since the poor households have cut trees from there. Cutting trees from the conservation- and protection forests are forbidden but collecting of NTFPs are allowed. The cultural forest areas that contain cemetery- and sacred forest are protected, and it is not allowed to cut trees nor collect NTFPs.

According to the focus group discussions, the number of trees have decreased in the production forests in every study village over the past 10 years. The main reason was over- harvesting of trees. The village of Thalee-tai shared a protection forest with a neighboring village and according the local people there are now more trees than before, since the people respect the forest regulations. Similarly, there are more trees in conservation- and protection forests in Khanteung village. On the contrary, the people in Na-mai village said that the number of trees have decreased in conservation- and protection forests, since some people are not respecting the rules to not harvest trees.

According to the villagers the over-harvesting of trees have some impacts to environmental services. They point out that now the forests are hotter than before because the trees are not shading from the sun. In addition, local people said that there are now more soil degradation and soil loss in forests. Decreased number of trees are affecting also the water cycle and there are now more drought in the villages.

6.2.1 Forest clearance by the households

As can be seen in Figure 20, the households cleared forest in every study village. The percentage of households that cleared forest were just over 40% in the most urban Thalee-tai village. In Na-mai the percentage of households, that cleared forest were 60% of the respondents. In the most remote Khanteung village the percentage of households that cleared forest were 77%.

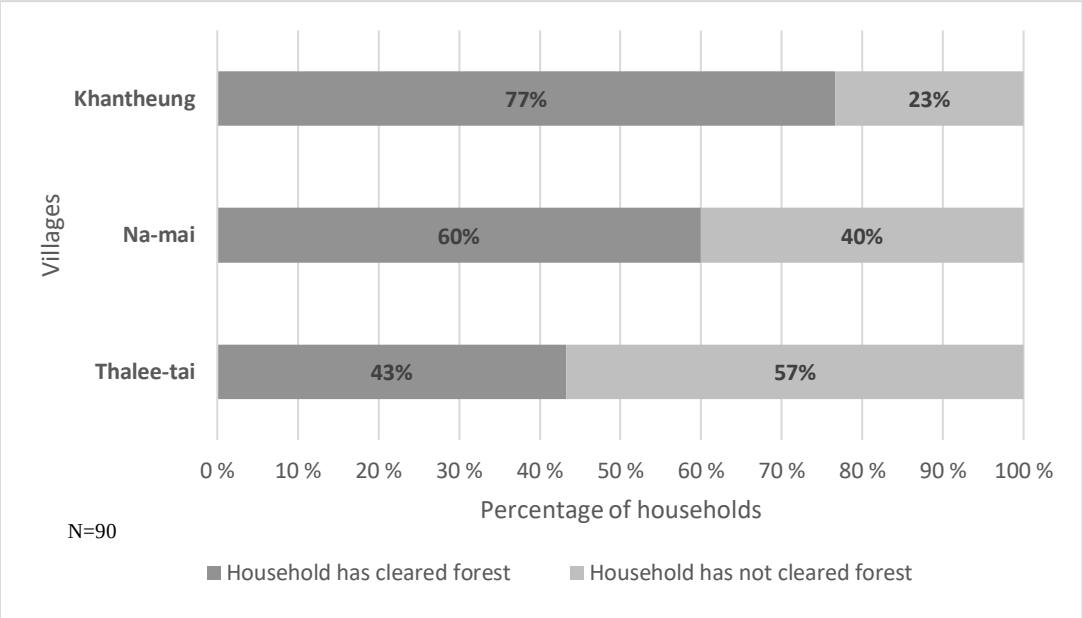

Figure 20. Forest clearance by the households over the past 10 years in the study villages

The average area cleared by the households in Thalee-tai was 0.56 hectares, in Na-mai 1 hectare and in Khantheung 1.5 hectares. The forest cleared in the villages was all private land. The farmers are mainly practicing swidden agriculture when they clear trees. Fallow forests are cleared for cropping land and the cut down trees are collected for fuelwood. In Thalee-tai, there were households that has cleared forest land for tree plantations. The average distance from the farmers house to the edge of the cleared area was 3.8 kilometers.

The results indicate that the households in more remote villages, such as Khanteung and Na-mai are more dependent on rotational shifting cultivation. The households clear trees mainly in fallow shifting land for cropping purposes. The main crops planted are upland rice and mixed vegetables. Compared to the other two study villages, the total area cleared in Thalee-tai was remarkably smaller and, thus the availability of agricultural land was lower. The people in Thalee-tai were willing to rent agricultural land from neighboring villages, because of increasing land pressure. In addition, the livelihoods of the people were slightly different than in other villages due to the nearby markets. These reasons could explain the differences in households forest clearances in the study villages.

6.2.2 Tree planting by the households

One of the objectives in the study was to examine the tree growing by the smallholders. The new land use policies and high market demand of timber and rubber has increased the tree planting in the villages. As the Figure 21 shows, there are moderate differences in percentages of tree planting by the households in the villages. In Thalee-tai, almost a half of the respondents has planted trees. In Na-mai the percentage of households were only 13% and in Khanteung village just under a third have planted trees. The relatively high tree planting percentage of households in Thalee-tai could indicate that people have more off-farm jobs, they are wealthier, and they are less dependent on subsistence agriculture. People have intensified their land use by planting high value tree crops. In more remote villages, such as Na-mai and Khanteung, smallholder households are still quite dependent on subsistence agriculture and only wealthier households can invest on tree crops.

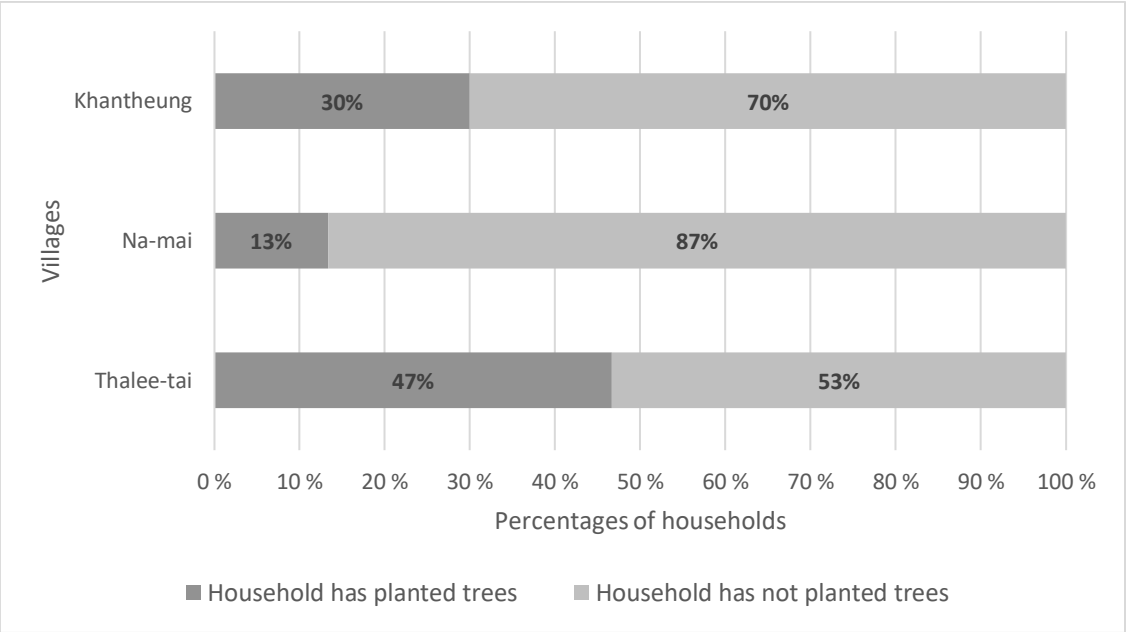

Figure 21. Tree planting by the households over the past 10 years in study villages.

The most important trees planted in the study villages were rubber tree, teak and rosewood. In addition, the households tend to grow many kinds of fruit trees in residential land. Popular fruit trees grown in residential land were, for example, jackfruit, longan tree and mango tree, etc. Approximately 17% of the sample households have planted rubber

trees and about 12% have planted teak. The third most popular tree planted by the households was rosewood, planted by approximately 6% of the respondents. More than 60% of the households in Thalee-tai and Na-mai villages and a half of the households in Khanteung have fruit or nut trees in their private residential land area.

As can be seen from the Figure 22, the main purposes for the tree planting in the past 10 years were timber and rubber production. The demand of high value wood, such as teak and rosewood is high. Likewise, the high demand of latex, especially in China has remain high. Access to rubber markets are good in the study area and every week middlemen comes to the village to gather the rubber from the farmers. Growing of fuelwood is rarer in the villages, most of the fuelwood are collected from the fallow shifting land.

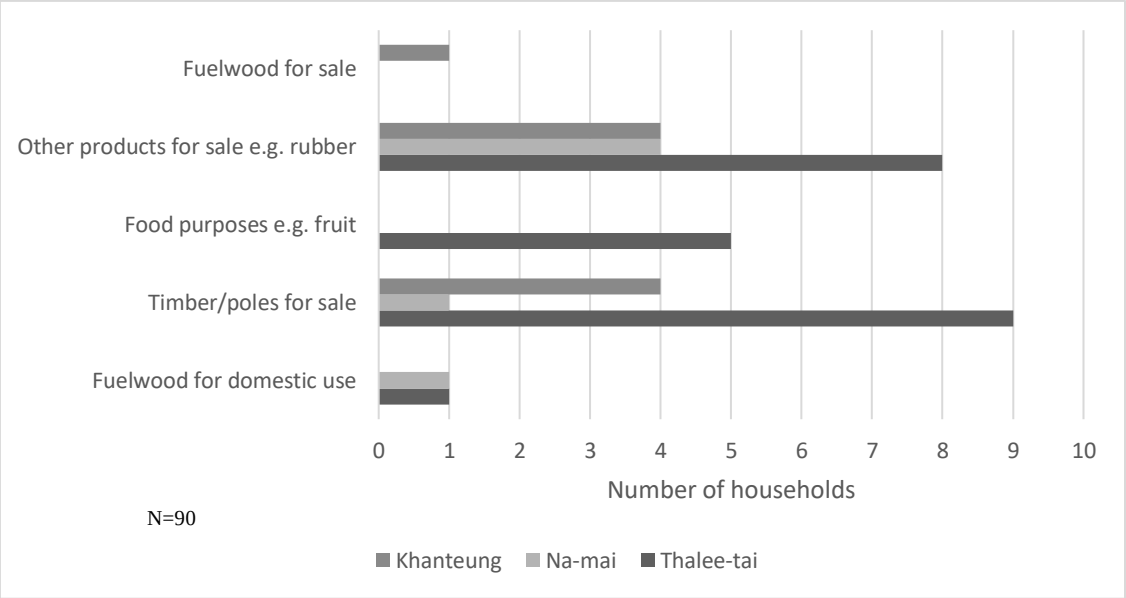

Figure 22. The main purposes of the tree planting over the past 10 years in the study villages.

The Table 2 shows the characteristics of the households owned tree plantations. The average size of the plantations were approximately 1 hectare. The small number of samples could distort the results, especially considering the rosewood woodlots. There are also high variation in number of trees in single plantations, which is maybe because of different growth statuses of trees.

Table 2. Characteristics of the households owned tree plantations in the study villages.

Tree species	N	Mean size of a plantation (ha)	Mean number of trees in plantation	Max. trees in plantation	Min. trees in plantation
Rubber	15	1.23±0.67	670±395	2000	400
Teak	11	0.77±0.34	592±756	2500	30
Rosewood	5	1.4±1.13	426±361	900	50

6.3 Access to and availability of forest resources

Forests provide many kinds of resources to the people living rural areas. According to the key informants and the focus group discussions, the access to trees has decreased because of the new regulations. However, poor households can get permission to cut trees for domestic use, as previously explained. In addition, there is also some illegal logging in the more remote village forests. The households harvest mainly mixed trees from the forest to build traditional houses and animal enclosures. Also, some tree branches are used as fuelwood for cooking. The population has increased in the villages and the villagers in each of the study villages said that the availability of NTFPs has decreased over the past 10 years, because of over harvesting. There is a high demand of specific NTFP resources in the area. Especially, the availability of some high valued products, such as broom grass and bamboo shoots has decreased. In response to the high demand, the farmers have domesticated some NTFPs. Table 3 shows the most important NTFPs for cash income and for subsistence in the study sites. Bamboo shoots and rattan are important for cash income and they are also nutritious food for the households. There is a high demand for broom grass and paper mulberry, and they are important income sources for the households. In addition, people eat young shoots of broom grass.

Table 3. Most important NTFPs in the study villages.

Village	NTFPs for cash	NTFPs for subsistence
Thalee-tai	Bamboo shoots, rattan, banana flowers & broom grass	Bamboo shoots, rattan, banana flowers & broom grass
Na-mai	Bamboo shoots, rattan, banana flowers, mushrooms, wild vegetables & Paper mulberry	Bamboo shoots, rattan, banana flowers, wild vegetables & mushrooms
Khanteung	Bamboo shoots, rattan, Paper mulberry & wild taro	Bamboo shoots, rattan, banana flowers & edible fern

The access to environmental resources has not changed over the past 10 years. The households have permission to collect NTFPs from the village forests, excluding from the cultural forests areas. The most common aquatic resources for subsistence and cash were snails, crabs, frogs and fishes. There were also overuse of aquatic resources in the villages. Population has increased and people are collecting resources too much. There are no rules to control the overfishing and the local people also mentioned that the waters are polluted, because of overuse of chemicals.

According to the study, increased incomes enables households to buy more food from the markets and the dependency of wild food has decreased. However, in case of severe shocks, households will likely increase the harvest of forest resources. In the past 10 years, the eating habits of the people have changed. Approximately 67% of the households now eat less wild food, however a third of the households have increased their use of wild food. Altogether 87% of the households said that their use of processed food has increased over the past 10 years. In addition, altogether 84% of the households said their usage of traditional medicines has decreased. The most common wild food eaten by the people during the study from October to December were rats, wild birds, different ferns and Pak nork which is a salad vegetable found in wetlands. The availability of the wild food often varies depending on the season. The wild food collected by the households in dry season can vary compared to the food collected in a rainy season.

6.4 The shocks experienced by the households

Poor smallholder farmers are vulnerable for many kinds of shocks. Their high dependency on agriculture and environmental resources for their livelihoods make them vulnerable for extreme weather events and pest- and disease outbreaks. This kind of events can cause severe crop losses and, thus have a negative impact to food security and farmers' incomes. In addition, farmers are vulnerable for several economic risks and health problems in families. Smallholder farmers in rural areas often lack formal safety nets and they have relatively low income-levels, which exacerbates the households coping with the shocks. To overcome shocks farmers can have several coping strategies and the resiliency for shocks often depends from the livelihoods assets the households possess. The objective was to identify the different kind of shocks that households have experienced over the past 12 months and how they have coped with the shocks.

In this study, the information from the changes in weather patterns, severe disease- and pest outbreaks and natural disaster was asked in focus groups discussions in each of the study villages. The information that the villagers provided was similar and this increased the credibility of the data. There were many kinds of problems that negatively affect agricultural activities and livelihoods. In 2018, intense rain and flooding of the river in the paddy fields caused rice yield losses in each of the study villages, since they are situated in the same river valley. However, the impact for the farmers livelihoods was not so severe. The villagers said that rainy season has become shorter. Nowadays, the rainy season starts later than before. The area has suffered from drought in 2019 and there has been yield losses particularly with upland rice. In addition, the drought has affected negatively to flowering of some cash crop plants. For example, droughts have caused yield losses in crops such as cardamom and galangal.

In Thalee-tai, the villagers said that they have suffered from major paddy rice yield losses, due to loss of soil fertility. They used to have 5 tons of paddy rice per 1 hectare and nowadays the yields are only 1.5–2 tons/ha. In addition, there now year pests- and disease outbreaks in the study area on an annual basis. Keeping of livestock has decreased, due to infection diseases in chickens and pigs, especially from December to March. According the local people, grasshoppers are a severe threat to crop plants. Every year, from April

to June, grasshoppers eat the leaves of corn and upland rice. The people also informed that there are nowadays more malaria infections in the villages from May to September.

In this study, the sample households were asked to describe all the shocks they have experienced in the past 12 months. Most of the shocks were related to agricultural activities and crop losses. In addition, the health-related problems were common in the households. Just over a third of the households said that they have health problems in the family. Often, some of the household members had long-term health issues, which has a negative impact on households' livelihoods. The answers recorded in the study were not always actually unexpected events in the moment, – chronic diseases could be long-term problem in the household. However, they often have negative impact on households' human assets. According the study, households have experienced only a few economic shocks, such as declined crop selling prices and raised food prices. Approximately 17% of households have experienced a livestock related shock. Most of the cases were related to infectious diseases of pigs and poultry, and there was also a few thefts of the livestock, such as chickens.

Altogether 10% of the respondents had suffered from water shortage in farming. Most shocks related to water shortage were in Thalee-tai village. Most of the shocks experienced by the households concerned crop failure due to drought. Approximately 36% of the households had suffered from crop losses due to drought. There was variation between the study villages. In Thalee-tai, altogether 10% of the households had experienced a drought related shock, whereas in Na-mai, the share of the households was 30%. Altogether 67% of the households in the most remote village Khanteung has experienced crop failure due to drought. Very probably, the reason for this variation between villages is that households in more remote villages are more dependent on upland shifting cultivation, for which drought has a particularly negative impact on upland rice and other vegetables. The Figure 23 shows the most common shocks experienced by the households during the past 12 months.

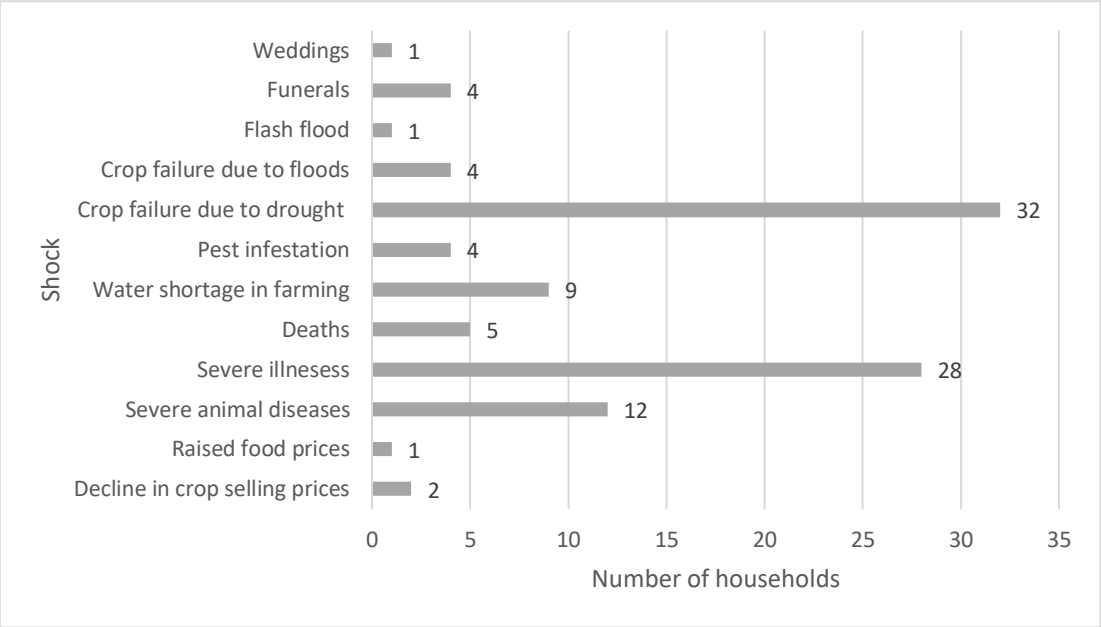

Figure 23. Shocks experienced by the households in general in the study villages.

6.4.1 The households' coping strategies with the shocks

The households in the study villages utilized several risk-coping strategies to overcome the shocks. The different kind of coping strategies depends form the severity of the shock experienced as well as the livelihood assets that households possess. According to the respondents, households generally use more than one strategy to survive the challenging times. For example, weddings or funerals demand relatively large monetary investments that poor households tend to borrow money from the relatives.

In this study, the most common shock was crop failure. However, many of the households said that the impacts to households' economies were fairly mild. This indicates that the crop yields losses were relatively minor, or the households have enough financial buffer. As can be seen from Figure 24, the most common coping strategy by the households were to use cash savings. The households used the cash savings usually to buy extra food such as rice from the markets. Many of the households also borrowed rice from the neighbors or from the relatives. They often make an agreement to pay back the borrowed rice from the next year's crop yield.

One of the popular shock coping strategies was to do extra casual work. There are large cash crop plantations established by foreign investors in the Nambak district. Men

especially worked casually in Chinese owned rubber- and watermelon plantations. Additionally, the households' men worked in construction sites to increase the financial buffer or to overcome shocks. Figure 24 shows that selling assets by the households was a rare coping strategy. The most common assets that sample households sold were livestock, such as chicken and ducks. The number of animals and which species families sell depends often on the severity of the shock.

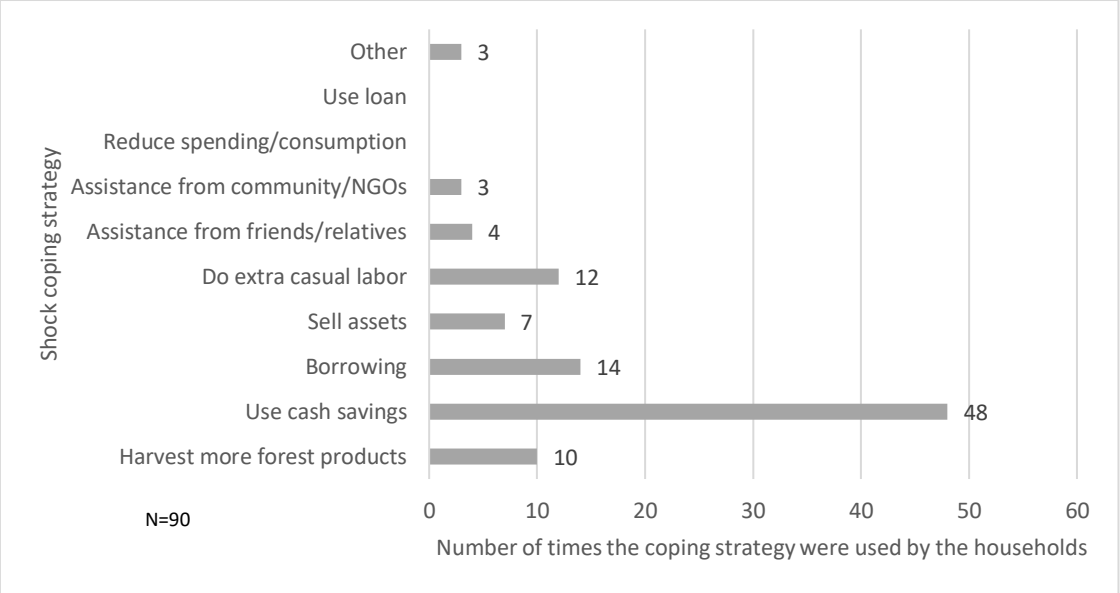

Figure 24. Most common shock coping strategies by the households over the past 12 months.

7. DISCUSSION

7.1 Discussion on theoretical framework

In this study, the sustainable livelihood framework was utilized to clarify the complex topic of livelihoods of smallholder farmers. In addition, the questions of the survey were mainly based on this theoretical framework. The main objectives of the study considered the changes in households' capital assets over the past 10 years. The livelihoods strategies that households follow depend, not only the capital assets, but also on the different structures and processes (Serrat 2017). One of the key objectives of the study was to examine how the government's relatively new land use policies have affected to the farmers' livelihood strategies and their access to forest resources. The livelihood strategies of the rural households are still related mostly to agricultural activities, but clearly, they have shifted to cultivate more valuable cash crops. The high demand of certain agricultural crops and new job opportunities have had positive impact to incomes of many households.

The objective of the study was also to examine the livelihood outcomes of the smallholders. Mainly, the study considered the changes in households' incomes and how sustainable is the use of natural resources by the households in the villages. In addition, the households' resilience for the shocks were examined − what kind of shocks households' have experienced and how they coped with the shocks. The time frame of the shocks experienced by the households was only 12 months. It is difficult to assess the actual resilience of the households, since the severity of shocks can vary a lot and there could be sometimes several single shocks in the same time. Also, the capital assets owned by the households can change rapidly, which can affect to the resilience to the shocks. The shocks experienced by the households, in this case study, were relatively minor and the increased incomes and cash savings enabled households to overcome and recover from the shocks.

The diversity of household livelihood strategies and crop varieties are not as resilient as they could be. For example, severe drought or pest infestations can cause a total crop loss

in monoculture farming. The cultivation of particular cash crops contain risks for the livelihoods of the farmers. The decreased demand and declined prices of products can decrease the incomes and have negative impacts to the households' food security. According to this study, at least for now, the high demand of cash crops has increased the incomes of the families in the study villages.

As Serrat (2017) point out in his article "The sustainable livelihoods approach", that the capital assets households holds are highly variable and the households access to different kinds of assets varies. The livelihood strategies are often dependent on which and how much capital assets households have. These livelihood strategies are important for the sustainable livelihood outcomes and for sustainable use of natural resources (Serrat 2017). This study showed that, for example, the improvements in physical capital, such as infrastructure, mobile-phone connection and new water supply systems have had positive impacts to people living in rural area. In addition, this study indicates that households have been able to increase their financial capital by their raised wage incomes and incomes from cash crop sale. Because of this, households resilience for shocks has improved, since they can use cash saving to cope with shocks. As Serrat (2017) point out, different trends and policies can also affect for capital assets, such as the access to natural capital. This study showed that trends in decreased availability of forest resources and decreased environmental services can have negative impacts for household livelihood outcomes. The government's land use policies and trends in cash crop business are also affecting to farmer's livelihood- strategies and outcomes.

7.2 The social- and ecological impacts of large-scale plantations

As Kenney-Lazar et al. (2018) argued in their study, the social and ecological sustainability of large-scale plantations could be problematic. The study points out the social- and economic risks of smallholders if the sale prices decline. The ecological risks consider the rapid changes in landscapes, which could decrease the biodiversity and loss of ecosystems services in the area. In addition, the smallholder could lose their access to crop land and to forest resources (Kenney-Lazar et al. 2018). The Chinese agribusiness plantations have had both negative and positive impacts in the study area. The owners of the large-scale rubber- and watermelon plantations have provided job opportunities to the

local people. According Vongvisouk et al. (2014) often the people without enough capital to invest in their land become laborers in cash crop plantations. As this study showed, the wages from casual plantation work has become important income source for the smallholder farmers in Na-mai and Khanteung villages. There have also been negative social impacts to the people. Large-scale plantations requires wide areas of arable land in the villages and now some of the disadvantaged households do not have enough cropping land. This could have negative impacts to food security and incomes of the families. It is unclear whether or not any forest was cleared when the plantations were established into the study villages. The large plantations can also decrease smallholders' the access to forest products, such as wild food. Kenney-Lazar et al. (2018) stressed the risk of chemical pollution in rubber growing. The study in Nambak District lends support to this point of view. The local farmers stated that the overuse of chemicals in the plantations have had negative impacts to the rivers and the quality of water has deteriorated because of contamination.

7.3 Changes in land use and crop production

According to this study there has been changes in farmers crop production and crop species over the past 10 years. The main reasons for the changes seems to be the governments restrictions for swidden agriculture and the high demand of some valuable crops in the area. The proximity of China and the improved market access has enabled the smallholders to profitably produce cash crops, such as galangal, cardamom, rubber and broom grass. Many households have reduced the cultivation of upland rice and began to grow these cash crops instead. The cultivation of valuable crops have raised the incomes of the households. In addition, growing of cash crops requires less work compared to growing, for example, upland rice. However, changes in market demand or oversupply of products can decrease the selling prices of cash crops and, thus have negative impacts on farmer's livelihoods.

The scarcity of arable land and focusing on only a few cash crops can result in food insecurity of smallholder households. If farmers replace the subsistence crops with monoculture cash crops there is a risk that in the event of market failure or crop losses, farmers could lose their important income sources and would therefore, not be able to buy

food from the market. As Manlosa et al. (2019) point out in their study "Livelihood strategies, capital assets, and food security in rural Southwest Ethiopia" the advisable livelihood strategy for smallholders is to cultivate a diverse combination of food- and cash crops. Hence, a good strategy to avoid food insecurity is maintain part of the farmland for rice production the yield of which should be sufficient for the household's annual demand.

One of the relatively new land use intensification processes in agriculture in the study villages is to cultivate vegetables or tobacco in the paddy field after the harvest of paddy rice. This can improve the food security and increase the incomes of the households. On the other hand, without sufficient fertilization this kind of intensification could lead to soil fertility losses for their staple food crop, paddy rice. According to the focus group discussion in Thalee-tai, the participants informed major paddy rice yield losses due to soil fertility losses in paddy field. Continual and intense cropping in paddy rice field will likely have negative impacts for farmers' food security and livelihoods in the future.

Households' land tenure is very secure in the villages. The government has allocated shifting land for the households. One of the problems is the increasing populations in the villages, due to in-migration of the people from other villages. Land pressures have increased and there is no suitable cropping land available for every household. Now, the households who hold only a little residential plot, need to rent or share additional land with some other household. They either pay money from the renting of land or give some share of the harvested crop yield to the landowner.

Tree planting has become more common in Laos, since the land tenure security has improved with new land policies implemented. The government has allocated land for the households for agricultural use in the villages. Thus, households have the opportunity to grow trees and they can be sure that they can benefit from them. However, the increasing land pressures in the villages and migration can hamper the land tenure. This research showed that many households migrated recently in the village have problems to receive enough residential- and agricultural land to make investments in their farms.

Growing trees such as teak, rubber and rosewood has increased in the study villages in the past 10 years. Especially growing of teak and rubber by relatively wealthy households became common in the study area. For example, in Thalee-tai many of the people with off-farm jobs, invest in tree growing. They are not so dependent on the farm income and

they can afford to wait for the revenues from the trees. The growing of rubber has also increased a lot in the study area. This is because there is a high demand of natural rubber in China and furthermore improved road access has enabled easy transportation of rubber to the processing factories.

As Vongvisouk (2014) points out, the government's aim to reduce deforestation and to increase forest cover in Laos with the Land and Forest Allocation program (LFA) could be contested. Agricultural intensification, opportunities to increase incomes from cash crops, and increasing land pressures in the villages lead to further deforestation and biodiversity loss. There is a risk that previous shifting land is not converted to forest land, but rather it is used to grow cash crops, the area of which may be extended into protected forest areas (Vongvisouk et al. 2014; Vongvisouk et al. 2016). A good way to prevent unwanted progress is to produce suitable village land use maps and to monitor the land use. On the other hand, the shortage of cropping land in the villages could cause social inequalities. The households' shortage of capital assets and land could prevent poor households from diversifying their livelihoods and to invest in cash crops or trees.

An eligible practice to conserve ecosystem services and prevent deforestation in the village areas is to introduce agroforestry systems in smallholder farms. Cultivation of cash crops and staple food crops mixed with trees would be ecologically sustainable and it would provide many environmental benefits such as carbon sequestration, erosion control, enhancement of soil fertility and improvement of water cycling.

7.4 Access to and availability of forest resources

The forests in the villages usually comprise production-, conservation-, protection-and cultural forests. The villagers at least in Na-mai and in Khanteung are quite well aware of the boundaries of the forests areas, since there are detailed village land use maps produced by the Agro-Biodiversity Initiative in the Lao PDR (TABI). Local people are allowed to cut trees for domestic use in the production forests, but permission is needed from the District Agriculture and Forestry Office. According to the focus group discussions, there are nowadays fewer trees in the village forests, especially in the production forests. Cutting of trees is not allowed in conservation and protection forests.

Despite restriction related to forest clearance there is still some illegal logging happening in the villages.

People are allowed to collect NTFPs from the forests, excluding from the cultural forests. As Castella et al. (2013) point out in their article "Effects of Landscape Segregation on Livelihood Vulnerability: Moving From Extensive Shifting Cultivation to Rotational Agriculture and Natural Forests in Northern Laos" that households are interested to collect more valuable forest products for sale, since the market accesses have improved. According to this study many of the valuable NTFPs are over-harvested and forests have degraded. In addition, increasing population is also affecting to overuse of some environmental resources. For example, this study found that bamboo and rattan have decreased in the village forests. The households still use and collect many kinds of NTFPs, but if the households' incomes continue to increase, the dependency for forest products could decrease. The more food the households can afford to buy from the market, the less dependent they become from the forest products. As Castella et al. (2013) point out, forests are "safety nets" for poor. Households utilize the forest resources to overcome from food shortages, or if they experience severe shock. In case of shocks, households' exploitation of forest products will likely increase. According to this study the people still eat a lot of bush meat, such as rats and wild forest birds in rural areas. In addition, fish, crabs and snails are important wild food in the villages.

7.5 Household shocks and coping strategies

The main shock experienced by the households in the study villages were crop losses due to drought, livestock deaths mainly due to infectious diseases and severe illnesses of household members. The farmers have suffered from crop losses for many years consecutively. Mainly the crop losses have concerned the upland rice, but also to some extent the cash crops, since the start of the rainy season has been delayed, and this has negatively affected to flowering of crops. Infectious diseases have killed mostly pigs and poultry in particular season and the farmers have experienced income losses due to this. In addition, the illnesses of households members impact negatively to households' wellbeing and livelihoods. Nguyen et al. (2018) argue in their article "Natural resource extraction and household welfare in rural Laos" that households often utilize and collect

many kinds of forest products to cope with shocks. Often people collect forest resources for sale and for additional food (Nguyen et al. 2018). This study also show that households extract more forest products when they have experienced shock. As mentioned in the article "Are health shocks different? evidence from a multishock survey in Laos" by Wagstaff and Lindelow (2014) common shock-coping strategies are borrowing, use of cash savings and selling assets. In this study the most used coping strategy to overcome from shocks was use of cash savings. Other important strategies were borrowing food or money from the relatives or neighbors, harvesting more forest products and to do extra casual work, for example in plantations. In some cases, households have sold their poultry to get extra cash. According the respondents, the crop losses were not so severe, and households were able to use cash savings to buy compensatory food from the market. As Wagstaff and Lindelow (2014) point out the financial support for households from government or from NGOs to cope from severe shocks are uncommon in Laos. This study support the argument, households did not receive any financial support from the government. Usually, the households have to resort the support from the relatives or neighbors.

7.6 Limitations of the study

Conducting field research and data gathering in developing countries is often challenging. One of the main problems is language barrier. In this study all the interviews were made in the Lao language by two local research assistants and then translated into English, thus increasing the probability for misunderstandings. It is therefore important to be sure that the assistants understand all the concepts and questions before the beginning of the data gathering. This is why much effort and time was spent in training the research assistants and testing of the questionnaires. Despite of the training, there are often problems with the interviews in the beginning for several reasons. It would be advisable that research assistants have previous experience with field-data collection methods. The limited resources, such as time and money in field work could lower the quality of the data. The research assistant work long hours during the data collection and there is a risk of losing the focus and doing the interviews in a hurry. The low education level of the respondents can also affect the data collection, with some of the concepts unfamiliar or unclear to the

people, thus it would be important to be sure that the interviewees clearly understand the questions.

Another challenge in conducting this study was land categories. The land categories seems to be somewhat unclear and it is difficult to distinguish the various land types and which crops are grown in what type of land. Another problem was to separate the planted crops from NTFPs. Many of the plants which grow originally in the forests are now domesticated by the farmers, since these species have become valuable cash crops. The assessment of the crop changes and the income sources was therefore a bit difficult. There could be slight bias in the data, since many of the questions considered the changes over a 10-year period. This could be difficult for the respondents to remember specific details from a relatively long period of time.

In addition, the estimation of deforestation rates and the availability of forest resources could be problematic. The data collected from the state of forests is based on the observations of the villagers. The examination of remote sensing data from the suitable timeline would be useful for confirming the results.

The questions in the household questionnaire related to the changes in frequency and intensity of climate events over the past 10 years was challenging for the respondents to answer. There could be annual variation in the weather and therefore it is difficult to assess the changes in seasonal weather patterns. There were some issues with the focus group discussions that should also be considered. In some of the group discussion there were some more dominant persons who were talking the most, while some of the participants remained silent. Generally, the focus group discussions went well and most of the participants took part in the conversations.

7.7 Generalization of the case study

The representativeness of the samples were good in the villages. In Thalee-tai the percentage of the interviewed households was 18% of the total amount of households, In Na-mai the percentage was 12% and in Khanteung the percentage was 20%. All the sample households were randomly selected and the changes in households' livelihoods were quite similar. The random selection of households allowed appropriate distribution

of different wealth classes of the households. The sample size is likely sufficient for the case study and the interviewed households represents the population in the villages well.

The study showed that there are differences between villages considering the income sources and crop production. The selected study villages were located by the gravel road. The good road access improved the access to the markets, since the transportation (including middlemen who service in the villages) of the crop products is easy. The households' livelihoods, in even more remote and not so accessible villages, could be different and probably the people are more dependent from the subsistence agriculture and from the forest resources.

The results of the study indicates that the high demand of some specific products in neighboring countries and livelihood impacts of large-scale land concessions could be generalized in many districts in the northern parts of Laos. The improved road accesses and the restrictions of swidden agriculture have changed the livelihoods of the smallholder farmers in the area. The main objective of this case study is to provide overview of the current trends in the three study villages; however, the result would apply to trends in agriculture, development and land use in Northern Laos in general.

7.8 Future research

Future research could consider appropriate market- and value chain analysis of the specific cash crops that are most cultivated in the region. By refining the unprocessed crop material more locally the farmers could profit more from the crops they grow. Another topic that would need more research is – how different households' characteristics affect the selection of crops cultivated in the farms by the households? It would be also interesting to know the households' total annual incomes and accurate composition of household income.

8. CONCLUSIONS

The ongoing economic development and agricultural shift from subsistence farming to cultivation of more permanent market-oriented agriculture has changed the livelihoods of smallholder farmers over the past 10 years. Improved market access and high demand of particular cash crops in neighboring countries has contributed to the agrarian change and farmers have introduced various kinds of cash crops in their farms. Many of the households are benefiting financially from the sale of crop products for the markets. With increased incomes households have been able to improve their wellbeing. The households have to some extent replaced their staple food crops, such as upland rice with cash crops and this could have also negative impacts for food security.

Fluctuating sale prices of cash crops could be a risk for farmer's livelihoods if demand and selling prices decline. Decreased incomes due to market failure and reduced subsistence agriculture may lead to food insecurity and increase the households' vulnerability for various shocks. Another risks for smallholders' livelihoods and for food security are extreme weather events and changes in weather patterns. Farmers in Nambak District have experienced more frequent droughts in the last 10 years, and this has led to crop losses especially with upland rice and some flowering cash crops. To secure households' incomes and food self-sufficiency it would be advisable to retain diverse crops in their farms and to cultivate enough rice in order to meet households' needs for annual consumption.

The households have diversified their income sources by having off-farm jobs and also through casual labor in plantations owned by foreign companies. In this way they can decrease their dependency from agricultural incomes. However, there are often only a few job opportunities in rural areas with relatively low daily pay rates, and the education levels are usually low among the farmers. Households living in more urban villages near business centers tend to have more job opportunities and wage income comparing the households living in more remote villages. The general economic- and infrastructure development and improvement of education could bring positive impacts for the people's wellbeing and livelihoods in the future.

The government's land use policies have impacted the environment and land use in the study area. Increasing land pressure and shortage of arable land due to increasing population, large-scale cash crop plantations and land allocation for farmers are affecting the livelihoods of the people. Some of the households are not able to benefit adequately for the agricultural development due to shortage of agricultural land. In addition, the households with low socioeconomic statuses and with scarce land holdings are not able to invest to cash crop cultivation and they have to stick with subsistence farming. Due to this, the wealth disparities among the farmers might remain or increase in the villages.

Relatively poor households are still dependent on forests resources for food and for income. People are collecting many kinds of NTFPs and harvesting trees from the nearby forests. Over-harvesting of trees and NTFPs has led to forest degradation and deforestation. Increasing land pressure could have negative impacts to forest cover, biodiversity, and the most vulnerable households in the future if the forests are cleared for cropping land for cash crops or food crops.

The government can contribute to rural development through various means. To improve ecological sustainability and promote sustainable rural livelihoods it is important to create favorable conditions for the development. The aims of the development policies should contribute to market access and furthermore to improve the conservation of ecosystems. The investments in infrastructure in rural areas are important for improving the market accessibility. The government should also provide extension services and incentives to farmers so that they can fully benefit from the livelihood strategies they follow. Functional land allocation policies are crucial for the forests protection and for enhancing the availability of cropping land for the farmers. The government should encourage smallholders to intensify their land use with diverse crops and, for example, with agroforestry systems.

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APPENDICES

Appendix 1: Household survey questionnaire

1. Control information ຄອບຄຸ້ມຂໍ້ມູນ

Date:

Interviewer:

Province:

District:

Village:

Household code: ລະຫັດເຮືອນ

Household family name:ຊື່ຄອບຄົບ

Mobile number:

Starting time: Ending time: Total discussion time (min.):

Read the following aloud to the respondent:
We will not share any of your personal details or answers with anyone. Any information you tell us will be kept confidential, and only used for the purposes of our research. We will make sure that your information is kept anonymous. This survey is voluntary, and you do not have to participate. But if you agree to participate, you may choose not to answer any questions that are uncomfortable to you, and you may stop at any time. We would greatly appreciate your cooperation and time. This interview will take ~ 1.5 hours.

Do you agree to take this survey? ☐ No ☐ Yes. R*espondent must say "Yes" for the survey to continue.*

Do you consent to have photos/video taken, which may be used in University materials? ☐ No ☐ Yes

2. Households' demographic information ຂໍ້ມູນກ່ຽວກັບປະຊາກອນໃນຄອບຄົວ

2.1 Household member relation to household head *(codes under table)* ສະມາຊິກໃນທີ່ເປັນຫົວໜ້າຄຄ *Mark the respondent(s) with asterix**	**2.2** Age ອາຍຸ	**2.3** Gender 0= male 1= female ເພດ 0= ຜູ້ຊາຍ 1=ຜູ້ຍິງ	**2.4** Marital status 1=married, 2=unmarried 3= widow ສຖະນະພາບ 1= ແຕ່ງງານ 2=ໂສດ 3ແມ່ໝ້າຍ	**2.5** Occupation ອາຊີບ	**2.6** Level of formal education 1. Primary school, complete 2. Primary school incomplete 3. Secondary school, complete, 4. Secondary school, incomplete 5. Vocational training 6. Univ. level complete 7. Univ. level incomplete 8. No formal education -9. Not known or won't answer -8. Not applicable

(Hh head) 0					

0=HH head, 1=spouse (legally married or cohabiting), 2=son/daughter, 3=son/daughter in law, 4=grandchild, 5=mother/father, 6=mother/father in law, 7=brother or sister, 8=brother/sister in law, 9=uncle/aunt, 10=nephew/niece, 11=step/foster child, 12=other family, 13=not related.

2.7 Was the household head born in this village? ☐ no ☐ yes. ຫົວໜ້າຄົວເກີດຢູ່ບ້ານນີ້ບໍ່?

2.8 What is the ethnicity of the household? ຄອບຄົວແມ່ນຊົນເຜົ່າຫຍ່ງ?

3. Household assets ຊັບສິນຂອງຄອບຄົວ?

3.1 How many of each of the following assets does your household own? ອັນໃດທີ່ຢູ່ຂ້າງລຸ່ມນີ້ຄອບຄົວ ຂອງທ່ານມີ?

Item	Motor-cycle	Tuktuk	Bicycle	Oxcart	Boat with motor	Boat no motor	Iron buffalo/ hand tiller	Car	Truck (big)	4 Wheel Tractor
# owned										
Item	Bus	Cook stove, gas/electric	TV	Computer	Mobile phone	Radio	Refrige-rator	Karaoke machine	Weaving machine	Sewing machine
# owned										

3.2 Ownership status of your current home/dwelling? ສະຖະນະພາບທີ່ຢູ່ອາໄສໃນປະຈຸບັນທ່ານແມ່ນເຈົ້າ ຂອງບໍ່?

☐ A household member has the title ສະມາຊິກຂອງທ່ານໃບຕາດິນບໍ່

☐ Family house (e.g., relative has the title) ເຮືອນຄອບຄົວ (ພີ່ນ້ອງມີໃບຕາດິນ)

☐ Another organization (i.e. government, private entities) owns title but the household does not pay rent
ອົງການຈັດຕັ້ງອື່ນໆ (ວັດຖະບານ;ນິຕິບຸກຄົນ) ມີເຈົ້າຂອງແຕ່ວ່າຄອບຄົວໄດ້ເຊົ່າ

☐ The household pays rent for this dwellingຄອບຄົວໄດ້ຈ່າຍຄ່າເຊົ່າບໍ່

☐ Other (specify) ອື່ນໆລະບຸ

_____

3.3 The walls of the main dwelling are predominantly made of what material? ເຮືອນຂອງທ່ານຝາ ເຮັດດ້ວຍຫຍັ່ງ**?**

□ Earth/dirt/stones, □ Wood, □ Iron/metal sheets, □ bricks, □ Concrete/cement, □ Grass/bamboo/straw
□ No walls, □ Other (specify)ອື່ນໆລະບຸ _____

NB: If the wall is made of multiple materials, choose the one that contributes the majority of the material.

3.4 The roof of the main dwelling is predominantly made of what material? ລ້ງຄານເຮືອນຂອງທ່ານ ມຸ້ງດ້ວຍຫຍັ່ງ?

□ Thatch/grass/bamboo □ Wood (boards), □ Iron/metal, □ Clay tiles, □ No roof
□ Other (specify) _____

NB: If the roof is made of multiple materials, choose one that contributes the majority of the material.

3.5 The floor of the main dwelling is predominantly made of what material? **ພື້ນເຮືອຂອງເຮັດ ດ້ວຍຫຍັ່ງ**?

□ Dirt, □ Wood (boards), □ Iron/metal sheets □ Tiles, □ Cement, □ Other (specify)ອື່ນໆລະບຸ _____

NB: If the floor is made of multiple materials, choose one that contributed the majority of the material

3.6 Does your household have running/piped water (tap) in the house? ☐ No ☐ Yes ຄອບຂອງທ້ານຕໍ່ນ້ຳເຂົ້າເຮືອນບໍ?

3.7 Does your household have electricity? **ຄອບຄົວຂອງທ່ານມີໄຟຟ້າບໍ່**?
☐ No
☐ Yes – connected to the grid
☐ Yes – using generator (private or shared)
☐ Yes – solar powered
☐ Yes– other (specify) _____

Land category *(code)*	**Lao name**	**No. of plots**	**Total area (ha)**	**Main species/crops/products/use of this land in the last 12 months**

1. Residential land	Din pouk sarng (ດິນປຸກສ້າງ)			Homegarden? Y/N Species: Fruit/nut trees? Y/N Species:
2. Paddy land	Din na (ດິນນາ)			
3. Pasture land	Kang lieng sud (ຄ້ັງລ້ຽງສັດ)			
4a. Shifting land currently with crop	Din hai kao (ດິນໄຮ່ເກົ່າ)			
4b. Fallow shifting land	1. Par Lao On ປ່າເຫຼົ່າອ່ອນ (ອາຍຸຕ່ຳກວ່າ 2 ປີ			
4c. Fallow shifting land	2. par Lao ປ່າເຫຼົ່າ (ອາຍຸລະຫວ່າງ 3-5 ປີ)			
4d. Fallow shifting land	3. Par Lao Kae ປ່າແກ່ (5 ປີ ຂຶ້ນໄປ)			
5. Other agriculture land not included above	Thi din ka si kum (ດິນກະສິກຳ)			
6. Pond	Nong sa (ໜອງສະ)			
7. Other land use (specify)	uen uen (ອື່ນໆ)			

Natural capital and land use ການນຳໃຊ້ທີ່ດິນໃນທຳມະຊາດ

4. Current household land ownership or rented/shared land ກຳ ມະສິດຄອບຄົວທີ່ດິນຫຼືເຊົ່າ / ທີ່ດິນແບ່ງປັນ

5. Have there been any changes in crop production by the household during the past 10 years? *E.g. type of crops grown, changes in yield/productivity, etc.* ຄອບຄົວເຄີຍມີການປ່ຽນແປງບໍ່ໃນການຜະລິດພືດໃນ 10 ປີ ຜ່ານມາ? ຕົວຢ່າງ ປະເພດການປູກພືດ/ຜົນຜະລິດປ່ຽນບໍ່/ກິດຈະກຳປູກປ່ຽນບໍ່

☐ No ☐ Yes

5.1 If yes, what kind of changes have there been and how have they affected the household's livelihood? ຖ້າປ່ຽນ, ແມ່ນຫຍັງທີ່ເຫັນວ່າປ່ຽນ

Changes in crop production	**Impact to the household?**	**Impacts** *e.g. more/less: work, income, food security*
1.	☐ *Positive* ☐ *Neutral* ☐ *Negative*	
2.	☐ *Positive* ☐ *Neutral* ☐ *Negative*	
3.	☐ *Positive* ☐ *Neutral* ☐ *Negative*	
4.	☐ *Positive* ☐ *Neutral* ☐ *Negative*	

ເຄີຍສົ່ງຜົນກະທົບຕໍ່ການດຳລົງຊີວິດຂອງຄອບຄົວ

6. FOREST/TREE CLEARANCE ການຖ່ຽງປ່າ/ ຕັດໄມ້

6.1 Over the last 10 years, has the household cleared any forest/trees?	☐ No ☐ Yes		
6.2 Approx. how much forest area/trees (TOTAL) did the household clear in the last 10 years? trees or (ha) ເນື້ອທີ່ປ່າໄມ້ເທົ່າໃດ/ ຕົ້ນໄມ້ ທັງໝົດທີ່ຄອບຄົວໄດ້ຖ່ຽງໃນ 10 ປີຜ່ານມາ			
6.3 For what primary purpose was forest/trees cleared during past 10 years? *Rank 3 most important reasons. ຈຸດປະສົງໃນເບື້ອງຕົ້ນແມ່ນຫຍັງທີ່ຖ່ຽງປ່າໃນລະຫວ່າງ10 ປີ ຜ່ານມາ* *1 = cropping ປູກພືດ* *2 = tree plantation ປູກຕົ້ນໄມ້* *3 = pasture/grazing livestock ຄັກລ້ຽງສັດ/ ທົ່ງຫຍ້າລ້ຽງສັດ* *4 = non-agricultural uses ການໃຊ້ທະເນີ່ງ*	Rank 1	Rank 2	Rank 3

5 = timber extraction ໄມ້ທ່ອນ *6 = for firewood or charcoaling ເຮັດຝືນ ຫຼື ເຮັດຖ່ານ* *99 = other, specify: ອື່ນໆ ລະບຸ*			
6.4 What type of forest did you clear? ປ່າປະເພດຫຍັງໄດ້ຖ່າງ? *1 = village forest, 2 = private owned, 3 = national or provincial government-owned*			
6.5 How far is it from your house to the edge of the forest/trees that you have cleared (one way)?	(Km)		

7. TREE PLANTING ການປູກຕົ້ນໄມ້

7.1 Has your household planted any trees over the past 10 years? ຄອບຄົວຂອງທ່ານໄດ້ປູກຕົ້ນໄມ້ຫຍໍ້ງ 10 ປີຜ່ານມາ	No ☐ Yes ☐

7.2 Most important tree species grown ຊະນິດຕົ້ນໄມ້ປູກທີ່ສຳຄັນ	**7.3** No. of trees and/or area planted (ha) ເນື້ອທີ່	**7.4** Main purpose(s) for growing *(codes under the table)* *Rank three most important purposes* **ຈຸດປະສົງຫຼັກທີ່ປູກ**		
1.	_____ , _____ ha	1.	2.	3.
2.	_____ , _____ ha	1.	2.	3.
3.	_____ , _____ ha	1.	2.	3.
4.	_____ , _____ ha	1.	2.	3.
5.	_____ , _____ ha	1.	2.	3.

1 = fuelwood for domestic use
2 = fuelwood for sale
3 = fodder for own use
4 = fodder for sale
5 = timber/poles for own use
6 = timber/poles for sale
7 = medicinal purposes (e.g. neem)
8 = food purposes e.g. fruit
9 = other domestic uses
10 = other products for sale
11 = carbon sequestration
12 = other environmental services
13 = for shading of agriculture
14 = reducing soil erosion
15 = aesthetic reasons
16 = land demarcation
17 = to increase the value of land
18 = for children/grandchildren future
19 = to improve soil fertility
20 = to improve crop yields
99 = other, specify:

8. Changes in household's use of chemical fertilizers or animal manure in the past 10 years ຄອບຄົວຂອງທ່ານປ່ຽນການໃຊ້ຝຸ່ນເຄມີ ຫຼື ອາຈຸມຂອງສັດ

8.1 Chemical fertilizers ຝຸ່ນເຄມີ: □ More use □ Less use □ Same □ Not used at all

Explain:

8.2. Animal manure ຝຸ່ນຄອກ: □ More use □ Less use □ Same □ Not used at all

Explain:

8.3 Changes in household's use of pesticides or herbicides in the past 10 years ຄອບຄົວໄດ້ປ່ຽນໃຊ້ຢາປັບສັດຕູພືດ

□ More use □ Less use □ Same □ Not used at all

Explain:

Land tenure and access to forest resources ສິດຄອບຄອງທີ່ດິນ ແລະ ການເຂົ້າເຖິງຊັບພະຍາກອນປ່າໄມ້

9. Do you think you have secure land tenure? □ Yes □ No, why not? ທ່ານຄິດວ່າທ່ານມີສິດຄອບຄອງທີ່ດິນຢ່າງປອດໄພບໍ?

9.1 Has the household acquired extra land in the last 10 years? □ No □Yes ຄອບຄົວໃດມີທີ່ດິນພິເສດໃນ 10 ປີຜ່ານມາ

9.2 If yes, how was it acquired: □ *buy,* □ *rent*, □ *inherit*, □ *other* ຖ້າມີ, ໄດ້ມາແນວໃດ

9.3 For what purpose is the land used? ທີ່ດີໃຊ້ສໍາລັບຈຸດປະສົງຍັງ?

Changes in livelihoods ການປ່ຽນແປງຊີວິດການເປັນຢູ່

10. What are the three most important changes in the household during the past 10 years? (*Ranked*).

3 ອັນທີ່ມີການປ່ຽນທີ່ສໍາຄັນຂອງຄອບຄົວໃນໄລຍະ 10 ປີທີ່ຜ່ານມາແມ່ນຫຍັງ?

Most important changes in the household ປ່ຽນທີ່ສໍາຄັນທີ່ສຸດ
1.
2.
3.

(Physical capital)

11. Have there been any changes to your dwelling/house during the past 10 years? Have the changes been

ເຄີຍມີການປ່ຽນທີ່ຢູ່ອາໄສ/ເຮືອນໃນ 10 ປີຜ່ານມາບໍ? ເຄີຍມີການປ່ຽນ

□ *Positive* □ *No change* □ *Negative , please explain?* ອະທິບາຍ:

12. Household's livestock

Livestock type	12.1 No. currently owned	12.2 No. Sold: past 12 months	12.2 No. eaten/used past 12 months	12.3 Change in livestock numbers: past 10 years. *General trend*	12.4 Reasons for the changes in livestock (the general trend) in the past 10 years
1. Pigs				□ *increased* □ *decreased* □ *stable* □ *variable*	
2. Buffalo				□ *increased* □ *decreased* □ *stable* □ *variable*	
3. Cattle				□ *increased* □ *decreased* □ *stable* □ *variable*	
4. Chicken				□ *increased* □ *decreased* □ *stable* □ *variable*	
5. Ducks				□ *increased* □ *decreased* □ *stable* □ *variable*	
6. Turkey				□ *increased* □ *decreased* □ *stable* □ *variable*	
7. Other:_____				□ *increased* □ *decreased* □ *stable* □ *variable*	

(Financial capital)

13. What are the household's main income sources? *Rank the main livelihood activities/income categories below from most to least important for both cash & subs* (*1 = most important*) (5=least) ແຫຼ່ງລາຍໄດ້ຕົ້ນຕໍຂອງຄົວເຮືອນໃນ 12 ເດືອນຜ່ານມາມີຫຍັງແດ່? ຈັດອັນດັບກິດຈະ ກໍາ ການ ດໍາ ລົງຊີວິດຕົ້ນຕໍ / ປະເພດລາຍໄດ້ລຸ່ມນີ້ຈາກສິ່ງ ສໍາ ຄັນທີ່ສຸດ ສໍາ ລັບທັ້ງເງິນສົດ & ຍ່ອຍ (1 = ສໍາ ຄັນທີ່ສຸດ) (5 = ໜ້ ອຍ ທີ່ສຸດ)

Income category (& main activity)	**13.1 Cash <u>past 12mo</u>**	**13.2 Changes in cash income sources <u>past 10 years</u>** ການປ່ຽນແປງແຫຼ່ງລາຍຮັບ ເປັນເງິນສົດ	**13.3 Subsistence** ການລ້ຽງຊີບ **<u>past 12mo</u>**	**13.4 Changes in subsistence <u>past 10 years</u>** ການພິ່ງພາ ອາໄສກັ້ມຕົ້ນເອງ	**13.5 Notes**
1. Crop _____		□ Increased □ Decreased □ No change		□ Increased □ Decreased □ No change	
2. NTFP _____		□ Increased □ Decreased □ No change		□ Increased □ Decreased □ No change	
3. Non-forest wild products _____		□ Increased □ Decreased □ No change		□ Increased □ Decreased □ No change	
4. Timber _____		□ Increased □ Decreased □ No change		□ Increased □ Decreased □ No change	
5. Livestock _____		□ Increased □ Decreased □ No change		□ Increased □ Decreased □ No change	
6. Wage _____		□ Increased □ Decreased □ No change			
7. Business _____		□ Increased □ Decreased □ No change			
8. Other off-farm*(specify)* _____		□ Increased □ Decreased □ No change			

14. Changes in the household's overall cash <u>income level</u> during the <u>past 10 years</u> ການປ່ຽນແປງ ໃນລະດັບລາຍໄດ້ເປັນເງິນສົດໂດຍລວມຂອງຄົວເຮືອນໃນຊ່ວງ 10 ປີທີ່ຜ່ານມາແມ່ນມີຢູ່ແລ້ວ

□ Increased □ no change □ decreased

14.1 What are the reasons for the changes in overall cash income level?
ມີເຫດຜົນຫຍັງແດ່ທີ່ເຮັດໃຫ້ການປ່ຽນແປງໃນລະດັບລາຍຮັບເປັນເງິນສົດໂດຍລວມ?

Reasons for cash income level changes (Rank; 1 is most important!) ເຫດຜົນຂອງການປ່ຽນແປງ ລະດັບລາຍໄດ້ຂອງເງິນສົດ

1.
2.
3.
4.

Food security & dietary diversity ຄວາມ ໝັ້ນ ຄົງດ້ານສະບຽງອາຫານແລະຄວາມຫຼາກຫຼາຍ ຂອງອາຫານ

15.1 Did your household have enough rice (i.e. grown by themselves) to feed the family in the last 12 months?	No☐ Yes ☐											
15.2 How many months in the past 12 months did you not have enough rice to feed the household? Which months? (*mark with X*)	J	F	M	A	M	J	J	A	S	O	N	D
15.3 During the critical months when you did not have enough food to feed the household, how did your household cope? (*circle or explain*) 1) buying food ຊື້ອາຫານ 2) barter/trade with friends or relatives ການ ຄ້າຂາຍກັບໝູ່ຫຼືພີ່ນ້ອງ 3) collecting forest or wild products for eating 4) collecting forest or wild products for selling 5) Other; Explain:_____ _____	Explain:											
15.4 Do you think your children lack any nutrients? ທ່ານ ຄິດວ່າລູກຂອງທ່ານຂາດອາຫານບໍ່ **Why do they think so?** ເປັນ ຫຍັງຈຶ່ງຄິດແນວນັ້ນ	No☐ Yes ☐											

15.5 In past 10 years, how have the following changed in household (i.e. more or less now than 10 years ago):

a. Eating wild foods (e.g. forest fruits & veg, insects, wild animals, aquatic animals, etc.)	□ Increased □ Decreased □ No change
b. Growing food for your own eating (i.e. subsistence production)	□ Increased □ Decreased □ No change
c. Buying packaged/processed foods (e.g. noodles, biscuits, crackers, cans, drinks etc.)	□ Increased □ Decreased □ No change
d. Use of traditional medicines (plant and animal-based) - not for sale	□ Increased □ Decreased □ No change

15.6 What role do wild foods play in your household? E.g. for diet, tradition/culture, health.

Explain:

16. FOOD FREQUENCY QUESTIONNAIRE: 7-day recall, ຄຳຖາມກ່ຽວກັບອາຫານການກິນ(ໃນ 7 ວັນ)

Respondent: the woman who is mainly responsible for taking care of the *reference child*. If no child, the respondent should be the person mainly responsible for food preparation (usually the woman).

Reference child: Select one child in the household aged between 2-5 years old.

In the last 7 days, on how many **days** has the respondent & the REFERENCE CHILD consumed the different food types listed in column A?

Explain that you want the number of DAYS, not the number of times. E.g. if the child ate rice 3 times a day for 7 days, then the answer is 7, if only once per day for 7 days, then the answer is still 7

A. Food types (list will be modified based on FGD)	**No. of days food consumed in last 7 days**		**Main source of food** 1 = own production 2 = bought 3 = wild harvested 4 = combination (explain)
	Respondent Male= 0 Female=1 _____	Reference Child Age: ____	
Paddy rice			
Upland rice			
Corn/ maize			
Job's tears			
Cassava			
potato			
Taro ມັນເຜືອກ			
White sweet potato			
Ginger			
Galangal ຫວາຍ			
Pumpkin			

Orange sweet potato			
Carrots			
Wild harvested leafy vegetables			
1. Fern ຜັກກູດ			
2. Add more:			
3. Add more:			
Cultivated leafy vegetables			
1. White vegetable (Chinese cabbage)			
2. Coriander			
3. Chervil			
4. Water cress			
Morning glory			
Onion			
garlic			
Eggplant			
tomatoes			
Mango			
Orange			
Papaya (ripe)			
Jackfruit			
Lime			
Banana			
Tamarind			

Papaya (green)			
Pineapple			
Pork			
Beef			
Chicken			
Duck			
Buffalo			
turkey			
Rat			
Wild bird			
Mole			
Liver (of which animal:_____)			
Heart (of which animal:_____)			
Blood (of which animal:_____)			
Fish			
frog			
snail			
Shrimp			
Crab			
Cow pea			
Long beans			
Sugar beans			
Other beans			

Peanut			
Pumpkin seeds			
Sunflower seeds			
Other seeds?:_____			
Cow Milk			
Butter			
Cheese			
Coconut oil			
Palm oil			
Soy bean oil			
Other oil:_____			
Sugar			
Candies			
Chocolate			
Packaged noodles ໝີ່ທີ່ຫໍ່ຫຸ້ມ			
Packaged biscuits or crackers ເຂົ້າໜົມປັ໋ງ ແລະ ກະແລັມ			
Other packaged food:_____			
Pepsi, coke, fanta, etc.			
Packaged juice ນ້ຳ$ໝາກໄມ້ຫໍ່ຫຸ້ມ			
Alcohol			
Tea			
Coffee			

(Human capital) ທຶນມະນຸດ

17. How do you consider your household's changes in health during the past 10 years been?

ທ່ານຄິດແນວໃດກ່ຽວກັບການປ່ຽນແປງຂອງສຸຂະພາບໃນຄອບຄົວຂອງທ່ານໃນໄລຍະສິບປີທີ່ຜ່ານມາ?

□ Positive □ Negative □ No change, please explain.

18. How has the household's workload changed during the past 10 years?

ພາລະຂອງຄອບຄົວມີການປ່ຽນແປງແນວໃດໃນໄລຍະສິບປີທີ່ຜ່ານມາ**?**

□ Increased □ Decreased □ No change, please explain.

19. Have you hired any external labour in the past 12 months? □ No □ Yes, Temporary or Yes, □ Permanent

ທ່ານໄດ້ຈ້າງແຮງງານພາຍນອກໃນ 12 ເດືອນຜ່ານມາບໍ? □ບໍ່ແມ່ນ□ແມ່ນແລ້ວ, ຊົ່ວຄາວຫຼືແມ່ນ, □ ຖາວອນ

19.1 If yes, for what purposes? ແມ່ນແລ້ວ, ເພື່ອຈຸດປະສົງຫຍັງ?

20. How has drinking water availability changed in the past 10 years? Please explain.

ໃນ 10 ປີທີ່ຜ່ານມາການມີນ້ຳດື່ມໄດ້ປ່ຽນແປງແນວໃດ? ກະລຸນາອະທິບາຍ.

21. How has drinking water quality changed in the past 10 years? Please explain.

ຄຸນນະພາບນ ້ ຳ ດື່ມໄດ້ປ່ຽນແປງແນວໃດໃນສິບປີທີ່ຜ່ານມາ? ກະລຸນາອະທິບາຍ.

Climate-related changes

22. Have your household noticed any climate-related changes in your living district during the past 10 years?

ຄອບຄົວຂອງທ່ານໄດ້ສັງເກດເຫັນການປ່ຽນແປງທີ່ກ່ຽວຂ້ອງກັບດິນຟ້າອາກາດໃນເຂດທີ່ທ່ານອາໄສຢູ່ໃນຊ່ວງ 10 ປີທີ່ຜ່ານມາບໍ?

22.1 Climatic events (Frequency) ເຫດການສະພາບອາກາດ (ຄວາມຖີ່)	**22.2** Impact to the household's livelihoods? ຜົນກະທົບຕໍ່ຊີວິດການເປັນຢູ່ຂອງຄົວເຮືອນບໍ?	**22.3** How the possible climate-related changes have affected to the households' livelihood? Please explain. ການປ່ຽນແປງທີ່ກ່ຽວຂ້ອງກັບດິນຟ້າອາກາດມີຜົນກະທົບແນວໃດຕໍ່ຊີວິດການເປັນຢູ່ຂອງຄົວເຮືອນ? ກະລຸນາອະທິບາຍ.
Drought □ More □ less □ No change	□ Positive □ Neutral □ Negative	
Floods □ More □ less □ No change	□ Positive □ Neutral □ Negative	
Storms □ More ພາຍຸ □ less □No change	□ Positive □ Neutral □ Negative	
Precipitation ຝົນຕົກ □ More □ less □ No change	□ Positive □ Neutral □ Negative	

Seasonal changes in weather (e.g. irregular rainfall timing, changes in wet/dry seasons) □ More □ No change	□ Positive □ Neutral □ Negative	

22.4 Climatic events ເຫດການສະພາບອາກາດ (Intensity)	**22.5** Impact to the household's livelihoods? ຜົນກະທົບຕໍ່ຊີວິດການເປັນຢູ່ຂອງຄົວເຮືອນບໍ?	**22.6** How the possible climate-related changes have affected to the households' livelihood? Please explain. ການປ່ຽນແປງທີ່ກ່ຽວຂ້ອງກັບດິນຟ້າອາກາດມີຜົນກະທົບແນວໃດຕໍ່ຊີວິດການເປັນຢູ່ຂອງຄົວເຮືອນ? ກະລຸນາອະທິບາຍ.
Drought □ Increased □ Decreased □ No change	□ Positive □ Neutral □ Negative	
Floods □ Increased □ Decreased □ No change	□ Positive □ Neutral □ Negative	
Storms □ Increased □ Decreased □ No change	□ Positive □ Neutral □ Negative	
Precipitation □ Increased □ Decreased □ No change	□ Positive □ Neutral □ Negative	
Temperature □ Increased □ Decreased □ No change	□ Positive □ Neutral □ Negative	

Shocks and adaptation strategies ກົນລະຍຸດຊັອກແລະການປັບຕົວ

23. Has your household experienced any health-related shocks in the <u>past 12 months</u> that have negatively affected your welfare and livelihood? ຄອບຄົວຂອງທ່ານໄດ້ປະສົບກັບຄວາມອຶດກັງວົນທີ່ກ່ຽວຂ້ອງກັບສຸຂະພາບໃນ 12 ເດືອນທີ່ຜ່ານມາທີ່ສົ່ງຜົນກະທົບທາງລົບຕໍ່ສະຫວັດດີການແລະການເປັນຢູ່ຂອງທ່ານບໍ? (see codes at bottom of page 13)

Shock	**23.1 (x) yes**	**3.2 coping/adaptation strategy of household** ຍຸດທະສາດໃນການຮັບມື / ການປັບຕົວຂອງຄົວເຮືອນ

1. Severe illness		
2. Deaths		
3. Injuries		
4. Any other?		

24. Has your household experienced any economic or market failure shocks in the past 12 months that have negatively affected your livelihood? ຄອບຄົວຂອງທ່ານໄດ້ປະສົບກັບບັນຫາທາງເສດຖະກິດຫລືຄວາມລົ້ມເຫຼວຂອງຕະຫລາດໃນ 12 ເດືອນທີ່ຜ່ານມາທີ່ສົ່ງຜົນກະທົບທາງລົບຕໍ່ການ ດໍາ ລົງຊີວິດຂອງທ່ານບໍ? (see codes at bottom of page 13)

Shock	**24.1 (x)**	**24.2 coping/adaptation strategy of household** ຍຸດທະສາດໃນການຮັບມື / ການປັບຕົວຂອງຄົວເຮືອນ
1. Decline in crop/wood selling prices		
2. Business failure		
3. Raised food prices		
4. Unemployment		
5. Lack of access to market		
6. Raised price of agricultural inputs		

25. Has your household experienced any crop failure or tree-related shocks in the past 12 months that have negatively affected your livelihood? ຄອບຄົວຂອງທ່ານໄດ້ປະສົບກັບຄວາມລົ້ມເຫຼວຂອງການຈໍ່ກທີ່ກ່ຽວຂ້ອງກັບພືດຫຼືຕົ້ນໄມ້ໃນຮອບ12ເດືອນຜ່ານມາໄດ້ສົ່ງຜົນກະທົບດ້ານລົບຫຍັງຕໍ່ການ ດໍາລົງຊີວິດຂອງທ່ານບໍ? (see codes bottom of page 13)

Shock	**25.1 (x)**	**25.2 - What crop or tree? Coping/adaptation strategy of household (specify)** ຍຸດທະສາດການຮັບມື / ການປັບຕົວຂອງຄົວເຮືອນ (ລະບຸວ່າພືດຫລືຕົ້ນໄມ້ຊະນິດໃດ)
1. Pest infestation		
2. Diseases		
3. Declined yields due		

to soil loss		
4. Crop failure due to drought		
5. Crop failure due to floods		
6. Labor shortage		
7. Land loss		
8. Landslide		
9. Any other? specify		

Adaptation strategies e.g.*: 1. harvest more forest products 2. Use cash savings 3. Borrowing 4. Sell assets 5. Do extra casual labor/on-farm /off-farm job 6. Assistance from friends/relatives 7. Assistance from community/religious organizations/NGOs 8. Reduce household spending/consumption 9. Use loan 10. other, please specify.* ຍຸດທະສາດການປັບຕົວຕົວຢ່າງ: 1. ເກັບກ່ຽວຜະລິດຕະພັນປ່າໄມ້ຫລາຍຂຶ້ນ 2. ໃຊ້ເງິນຜ່ານປະຢັດເງິນ 3. ກູ້ຢືມເງິນ 4. ຂາຍຊັບສິນ 5. ເຮັດແຮງງານເສີມ / ເຮັດໄຮ່ເຮັດນາ / ນອກໄຮ່ນາ 6. ການຊ່ວຍເຫລືອຈາກເພື່ອນ / ຍາດພີ່ນ້ອງ 7. ການຊ່ວຍເຫລືອຈາກຊຸມຊົນ / ອົງການຈັດຕັ້ງທາງສາສະ ໜາ / ອົງການ NGO 8. ຫຼຸດຜ່ອນການໃຊ້ຈ່າຍໃນຄອບຄົວ / ການຊົມໃຊ້ 9. ໃຊ້ເງິນກູ້ 10. ອື່ນໆ, ກະລຸນາລະບຸ.

26. Has your household experienced any water-related shocks in the past 12 months that have negatively affected your livelihood? ຄອບຄົວຂອງທ່ານໄດ້ປະສົບກັບຄວາມລົ້ມແຫຼວຂອງການຊອ່ກທີ່ກ່ຽວຂ້ອງກັບນ້ຳໃນຮອບ 12ເດືອນຜ່ານມາໄດ້ສົ່ງຜົນກະທົບດ້ານລົບຫຍັງຕໍ່ການດຳລົງຊີວິດຂອງທ່ານບໍ່? (see codes at bottom of page 13)

Shock	**26.1 (x)**	**26.2 coping/adaptation strategy of household** ຍຸດທະສາດໃນການຮັບມື / ການປັບຕົວຂອງຄົວເຮືອນ
1. Water shortage in farmingການຂາດແຄນນ້ຳເຂົ້ານາ		
2. Shortage of drinking waterການຂາດແຄນນ້ຳໃຊ້-ກິນ		
3. Water pollution ມົນລະພິດນ້ຳ		
4. Any other? specify		

27. Have your household experienced any livestock-related shocks in the past 12 months that have negatively affected your livelihood? ຄອບຄົວຂອງທ່ານໄດ້ປະສົບກັບຄວາມລົ້ມແຫຼວຂອງ

ການຊອ່ກທີ່ກ່ງອຂ້ອງກັບສັດລ້ງໃ ນຮອບ12ເດືອນຜ່ານມາໄດ້ສົ່ງຜົນກະທົບດ້ານລົບຫຍັງຕ່ໍການດ່ໍາລ້ງຊີວິດ ຂອງທ່ານບ່?

Shock	**27.1 (x) yes**	**27.2 What livestock? Coping/adaptation strategy of household** ຍຸດທະສາດໃນການຮັບມື / ການປັບຕ໋ວຂອງຄ໋ວເຮືອນ (see codes at bottom of page 13)
1. Severe animal diseases ພະຍາດທ່ີຮ້າຍ ແຮງ		
2. Theft ໂຈນ		
3. Major livestock loss ບັນຫາທ່ີສັດສູນເສຍ		
4. Any other? specify		

28. Any other shocks or unexpected expenditures? *(funeral, wedding, major asset loss. etc.)* ອາການຊ໋ອກອ່ືນຫ ືການໃຊ້ຈ ່າຍທ່ີບ ່ຄາດຄ ິດບ ? (ງານສົບ, ງານແຕ ່ງດອງ, ການສູນເສຍຊ ັບສ ິນທ ່ີ ສ ໍາ ຄ ັນ. ແລະອ ່ືນໆ)

Unexpected ບ ່ໄ ດ ້ ຄາດຫ ວ ັ ງ **expenditures** ການ ໃ ຊ ້ ຈ ່ າ ຍ	**28.1 (x) yes**	**28.2 Coping/adaptation strategy of household** ຍຸດທະສາດໃນ ການຮັບມື / ການປັບຕ໋ວຂອງຄ໋ວເຮືອນ (see codes at bottom of page 13)
1.		
2.		
3.		

Appendix 2: Focus group discussion

Discussion leader: _____ Note taker: _____

Control information
Date:
Province:
District:
Village:
FGD code:
Starting time: Ending time: Total discussion time (min.):

Please read the following aloud to the respondent
My name is _____. I am part of a team of researchers and students from the University of Helsinki in Finland and Souphanouvong University, Lao PDR. We are doing a field-research on changes in households' livelihoods and land use. In addition, we make survey about food consumption. We have selected three villages in Nambak District to do this; Na-mai, Khan theung and Thalee-thai. We have visited the head of your village and have their permission to carry out this group discussion. We will not share any of your personal details or answers with anyone. Any information you tell us will be kept confidential, and only used for the purposes of our survey. We will make sure that your information is kept anonymous. This is voluntary, and you do not have to participate. But if you participate, you may choose not to answer any questions that are uncomfortable to you, and you may stop at any time. We would greatly appreciate your cooperation and time. This discussion will take about 2 hours or less.

1. What have been the main changes in the village in the <u>past 10 years</u>? What have caused them? What has been the impact for the livelihoods?ມີຫຍັ່ງທີ່ສຳຄັນທີ່ ປ່ຽນແປງບ້ານໃນ 10 ປີ ຜ່ານມາ? ມີຍ້ອນສາເຫດຫັຍ່ງ? ຜົນກະທົບຕໍ່ຊີວິດການຍເປັນຢູ່ບໍ?

Most important changes	**Perceived reasons for the changes**	**Impacts to livelihoods**
1.		
2.		
3.		
4.		
5.		

2. Have there been any severe pest and/or disease outbreaks in the <u>past 10 years</u> (e.g. crops, livestock, people and natural forests)? Have you noticed any changes in frequency and intensity of pest infestations and diseases? ໃນຍະ 10ປີ ເຄີຍມີພະບາດເກີດຂຶ້ນກັບພືດ ແລະສັດບໍ?ພືດ ການລ້ຽງສັດ ;ຄົນ ແລະ ປ່າທຳມະຊາດ)(ພວກ ທ່ານໄດ້ແຈ້ງການກ່ຽວກັບການລຳບາດຂອງພະຍາດ

3. Has the village experienced any natural disasters in the <u>past 10 years</u> (e.g. floods, fires or droughts, etc.)? What kind of damage and how have they affected household livelihoods? Any changes in intensity and frequency of climate related natural disasters?
ໃນບ້ານຂອງພວກທ່ານເກີດໄພພິບາດຈາກທຳມະຊາດບໍ່ໃນ10ປີ ຜ່ານມາ(ນ້ຳຖ້ວມ .ໄຟໄຫມ້. ໄພ ແຫ້ງແລ້ງ)ມີການປ່ຽນແປງທີ່ເກີດຖີ ແລະ ເຂັ້ມຂຸ້ນ ອາກາດມີປ່ຽນແປງກ່ຽວພັນກັບທຳມະຊາດ

4. Have you noticed any seasonal changes in weather (e.g. changes in monsoon seasons, irregular weather patterns)? How have the changes affected the livelihoods of the people?
ເຄີຍໄດ້ຮັແຈ້ງການລະດູການປ່ຽນແປງ(ອາກາດປ່ຽນແປງຕາມລະດູການ .ຮູບແບບອາກາດບໍ ສະຫມ່ໍາສະເຫມີ)ເປັນແນວໃດສົ່ງຜົນກະທົບຕໍ່ຊີວິດການເປັນຢູ່ແນວໃດ?

5. Have the households in the village suffered from increased land pressure (e.g. overuse of resources, conflicts) or lack of agricultural land in <u>the past 10 years</u>?
ມີ ຄຄ ໃນບ້ານທີ່ໄດ້ຮັບຄວາມກົ້ກດັນ ທີ່ດິນ (ໃຊ້ຊັບພະຍາກອນເກີນ , ຂໍ້ຂັດແຍ່ງ ຂັດເຂີນ) ທີ ດິນກະສິກ່ໍາຫນ້ອຍ

6. How do households use the forests in the village or nearby? Has access to forest resources changed in the <u>past 10 years</u>? (i.e. Rights to collect, own and/or use) ຄອບຄົວໃຊ້ນ່ໍາໃຊ້ປ່ໍາໄມ້ໃນບ້ານເປັນແນວໃດ ຫລື ທີ່ໃກ້ບ້ານ?ການເຂົ້າເຖິງແຫລ່ງຊັບ ຍາກອທ່ໍາມະຊາດໄດ້ແນວໃດໃ 10ປີຜ່ານມາ)?ສິດໃນການເກັບເຄື່ອງປ່ໍາ.ການນ່ໍາໃຊ້

7. What is the main economic activity/source of income for the villagers?
ເສດຖະກິດຫລັກມີຫຍັງແດ /ແຫ່ງລາຍຮັບສ່ໍາຄັນໃນບ້ານແມ່ນຫຍັ?

8. Rank the three most important income sources for the households' in the village (cash & subsistence) in the <u>last 12 months</u> *ແຫ່ງລາຍຮັບທີ່ສ່ໍາຄັນຂອງຄອບຄົວ ໃນບ້ານ)ລາຍຮັບສົດ .ກຸ່ມກີນ(ໃນ 12ເດືອນຜ່ານ*

Most important crops ພືດທີ່ສ່ໍາຄັນ		**Any significant changes in crops cultivated <u>in the past 10 years</u> (cash &/or subsistence). Perceived reasons for the changes.**ມີການປູກພືດໃດ່ທີ່ມີການປ່ຽແປງ ສ່ໍາຄັນໃນ 10ປີຜ່ານມາ)ພືດສົດ ແລະກຸ່ມຕ່ົງເອງ(ຮູ້ ສາເຫດທີ່ພາໃຫ້ມີການປ່ຽນແປງ
Cash ລ່ໍາຍໄດ້ສົດ	**Subsistence** ກຸ່ມຕ່ົນ ເອງ	
1.	1.	
2.	2.	
3.	3.	
Most important livestock ສັດລ້ຽງທີ່ສ່ໍາຄັນ		**Any changes in livestock (species, quantity)** ມີສັດລ້ຽງຫຍ່ງທີ່ປ່ຽນແປງ)ສະເພາະ ຈ່ໍານວນສັດ(

Cash ສົດ	**Subsistence** ກຸ້ມຕົນເອງ	
1.	1.	
2.	2.	
3.	3.	
Most important Non-timber forest products ເຄື່ອງປ່າຂອງດົງ		**Has the dependency of forest resources/NTFPs <u>in general</u> changed in the past 10 years? Explain.** ການເພິ່ງພາອາໄສ ແຫລ່ງຊັບພະຍາກອນປ່າໄມ້ໂດຍທົ່ວໄປມີການປ່ຽນແປ່ງບໍ ໃນ10ປີຜ່ານມາ?ອະທິບາຍ
Cash ສົດ	**Subsistence** ກຸ້ມຕົນເອງ	
1.	1.	
2.	2.	
3.	3.	
Most important timber/wood products ໄມ້ທອນ.ໄມ້ ***(note if from plantation (P) or natural forests (N) or a mix (%))*** ໄມ້ປູກ.ໄມ້ທຳມະຊາດ.ປ່າໄມ້ປະສົມ		
Cash ສົດ	**Subsistence** ກຸ້ມຕົນເອງ	
1.	1.	
2.	2.	
3.	3.	
Most important aquatic resources ຊັບພະນາກອນນ້ຳ		**Changes in aquatic resources** ຊັບພະນາກອນນ້ຳມີການປ່ຽນແປງ
Cash ສົດ	**Subsistence** ກຸ້ມກິນ	
1.	1.	
2.	2.	
3.	3.	

9. Has there been any significant changes in the main sources of income in the village in the past 10 years? ເຄີຍມີແຫລ່ງລາຍຮັບທີ່ສຳຄັນໃນບ້ານ ປ່ຽນບໍ ໃນ10ປີຜ່ານມາ?

10. Have you noticed any changes in forest (cover, composition, quality/degradation) in the village area or nearby in the past 10 years? ມີການແຈ້ງການກ່ຽວກັບການປ່ຽນແປງຂອງປ່າໄມ້ບໍ)ຄຸ້ມຄອງ .ອົງປະກອບ.ຄຸນນະພາບ .ການເຊື່ອມໂຊມ(ໃນ10ປີຜ່ານມາ

Forest types ປະເພດປ່າ	**6.1 What kind of changes?** ມີຫຍັງແດ່ປ່ຽນແປງ?	**6.2 Perceived reason for the change?** ຮັບຮູ້ສາເຫດບໍການປ່ຽແປງ?	6.3 Impacts to livelihoods ມີຜົນກະທົບຕໍ ຊີວິດການເປັນຢູ່ບ
1. Production/utilization forest ປ່າຜະລິດ			
2. Protection forest. ປ່າປ້ອງກັນ			
3. Conservation forest (village). Par sa nguan banປ່າ ສະຫງວນ			
4. National protected areas. ປ່າສະຫງວນ ແຫ່ງຊາດ			
5. Cultural forest areas (cemetery or sacred forest. ປ່າສັດ ສິດ ຫລືປ່າຊ້າ			

11. Are there any commercial tree plantations in the village area (teak, rubber, eucalyptus, fruits, etc.)? Who owns them? (private investors, community owned or households owned)? What was the previous land use? Were any fallows or forests converted to tree plantations? ມີພໍ່ຄ້າມາປູກໄມ້ໃນພື້ທີ່ບ້ານ(ໄມ້ສັກ .ໄມ້ໃຫ້ ຫມາກ(ໃຜແມ່ນເຈົ້າຂອງສ່ວນ.ໃຜໃຊ້ທີດິນ? ມີປ່າເຫລົ່າ ຫລື ປ່າໄມ້ປົກຄຸ້ມດ້ວຍປ່າໄມ້ປູກ?

12. How have the changes in village roads and transportation during the <u>past 10 years</u> affected your household? Have the changes been

□ *Positive* □ *No change* □ *Negative* □ *Mixed , please explain?*

Food consumption ອາຫານທີບ່ວິໃຜ

13. Describe the main markets where food is bought and sold? ອະທິບາຍກະຕະຫາດ ທີສໍາຄັນທີຊື ແລະຂ່າຍ

13.1. Name: ຊື

- (a) village; (b) district; (c) other? ບ້ານ.ເມືອງ ອື່ນໆ
- Location & distance from village: ສະຖານທີ .ໄລຍະທາງຈາກບ້ານ ຫາຕະຫາດ
- Description: ອະທິບາຍ

13.2 Name: ຊື່

- (a) village; (b) district; (c) other? ບ້ານ.ເມືອງ.ອື່ນໆ
- Location & distance from village: ສະຖານທີ່.ໄລຍະທາງຈາກບ້ານຫານຕະຫາດ
- Description: ອະທິບາຍ

13.3. Name:

- (a) village; (b) district; (c) other?
- Location & distance from village:
- Description:

14. Describe middlemen who come to village to buy and sell food (what products, when, how?) ອະທິບາຍພໍ່ຄ້າຄົນກາງທີ່ເຂົ້າມາຊື້ສິນຄ້າໃນບ້ານ ສິນຄ້າຫຍັ່ງ.ເມື່ອໃດ.ເຮັດແນວໃດ?)

15. Main food products eaten in the village in the course of the last 12 months
(not what is for sale, just what they actually eat) ແຫ່ວງອາຫານທີ່ສຳຄັນສຳລັບການກິນໃນ ບ້ານສຳລັບ 12ເດືອນຜ່ານ ມີຫຍັ່ງສຳລັບຂ່າຍ. ມີຫຍັ່ງສຳລັບກິນ

Food groups	**Species or product 1 (most consumed)**			**Species or product 2**			**Species or product 3**		
CEREALS (rice, maize, Job's tears, wheat, other)	Name:			Name:			Name:		
	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)
	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):
ROOTS or TUBERS (NOT ORANGE COLOURED ONES!) (cassava, yam, potato, white sweet potato, taro, sago, other roots or tubers)	Name:			Name:			Name:		
	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)
	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):
ORANGE VEGETABLES: PUMPKIN, SWEET POTATO or CARROTS	Name:			Name:			Name:		
	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)
	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):
FRESH LEAFY GREEN VEGETABLES? (wild or cultivated)	Name:			Name:			Name:		
	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)
	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):
OTHER VEGETABLES (tomatoes, onion, eggplant, pepper, etc)	Name:			Name:			Name:		
	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)
	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):
	Name:			Name:			Name:		

ORANGE FRUIT (including mango & other orange or red coloured fruits, wild or cultivated)	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)
	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):
OTHER FRUIT (e.g. banana, pineapple, wild or cultivated)	Name:			Name:			Name:		
	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)
	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):
FRESH MEAT (wild or farmed)	Name:			Name:			Name:		
	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)
	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):
ORGAN MEAT (e.g. liver, kidney, heart, intestine, blood, etc.)	Name:			Name:			Name:		
	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)
	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):
DRIED MEAT	Name:			Name:			Name:		
	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)
	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):
EGGS	Name:			Name:			Name:		
	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)
	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):

FRESH AQUATIC ANIMALS (fish, frogs, snails, crabs etc.)	Name:			Name:			Name:		
	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)
	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):
DRIED AQUATIC ANIMALS	Name:			Name:			Name:		
	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)
	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):
SMOKED AQUATIC ANIMALS	Name:			Name:			Name:		
	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)
	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):
SALTED AQUATIC ANIMALS	Name:			Name:			Name:		
	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)
	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):
PULSES (e.g. beans, lentils, peas, etc.)	Name:			Name:			Name:		
	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)
	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):
NUTS and SEEDS	Name:			Name:			Name:		
	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)
	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):
	Name:			Name:			Name:		

DAIRY PRODUCTS (e.g. milk, butter, cheese or other)	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)
	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):
OIL (cooking oil, palm oil, corn or soya or sesame oil, etc.)	Name:			Name:			Name:		
	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)
	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):
SUGAR, CANDY, or CHOCOLATE?	Name:			Name:			Name:		
	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)
	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):
FACTORY-PRODUCED FOODS, e.g. Instant noodles,	Name:			Name:			Name:		
	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)
	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):
HOME-MADE SNACK FOODS e.g. ?	Name:			Name:			Name:		
	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)
	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):
SWEETENED DRINKS e.g. coke, Fanta, tea, etc.	Name:			Name:			Name:		
	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)
	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):
ALCOHOLIC DRINKS	Name:			Name:			Name:		
	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)

	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):
COFFEE, TEA	Name:			Name:			Name:		
	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)
	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):
OTHER	Name:			Name:			Name:		
	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)	Wild-harvest (%)	Farmed (%)	Bought at market (%)
	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):	Land type (code/s):	Land type (code/s):	Market name(s):

Appendix 3. Key Informant Interview questionnaire

Key informant interview ການສຳພາດຂໍ້ມູນທີ່ສຳຄັນ

Interviewer ຜູ້ສຳພາດ: _____ Note taker ຜູ້ບັນທຶກ: _____

Control information ຂໍ້ມູນທີ່ຄອບຄຸ່ມ

Date ວັນທີ:
Province ແຂວງ:
District ເມືອງ:
Village ບ້ານ:
KII code ລະຫັດ:
Name of the interviewee ຜູ້ຖືກສ ໍາພາດ:
Position in the village ຕຳແໜ່ງ:
Phone number ເບີໂທ:
Starting time ເລີ່ມເວລາ: Ending time ເວລາສິ້ນສຸດ: Total discussion time (min.): ລວມ

Village background information ຂໍ້ມູນຄວາມເປັນມາຂອງບ້ານ

1. The history of the village ປະຫວັດຂອງບ້ານ

- Establishment year: ສ້າງຕັ້ງປີໃດ
- Main changes: ສິ່ງທີ່ປ່ຽນແປງສຳຄັນ

- Main economic activities in the past and nowadays: ກິດຈະ ກຳ ເສດຖະກິດຕົ້ນຕໍໃນໄລຍະຜ່ານມາ ແລະ ປະຈຸບັນ

2. Village demographics ປະຊາກອນໃນບ້ານ:

a) What is the population of the village? ຈຳນວນປະຊາກອນໃນບ້ານມີຈັກຄົນ?

b) Number of the households? ຈຳນວນຄອບຄົວມີຈັກຄອບຄົວ?

c) Is the population increasing or decreasing in the village? ມີປະຊາກອນໃນບ້ານເພີ່ມຂຶ້ນ ຫຼື ຫຼຸດລົງ ?

d) Ethnic groups in the village? ກຸ່ມຊົນເຜົ່າມີຈັກຊົນເຜົ່າ?:

e) Do the village have migrants? If yes, specify who they are and where they come from? Out-migration from the village – where to mainly? ບ້ານມີຄົນອົບພະຍົບບໍ? ຖ້າແມ່ນ, ລະບຸວ່າພວກເຂົາແມ່ນໃຜແລະ ພວກເຂົາມາຈາກໃສ? ການອົບພະຍົບອອກຈາກບ້ານ - ບ່ອນໃດສ່ວນໃຫຍ່?

f) Have there been any household livelihood surveys conducted in this village in the past? ຜ່ານມາເຄີຍມີການ ສໍາ ຫຼວດການ ດໍາ ລົງຊີວິດຂອງຄົວເຮືອນຢູ່ບ້ານນີ້ບໍ?

Infrastructure ພື້ນຖານໂຄງລ່າງ

3. What is the state of infrastructure of the village? When they were established? ສະພາບພື້ນຖານໂຄງລ່າງຂອງ ໝູ່ ບ້ານແມ່ນຫຍັງ? ໃນເວລາທີ່ພວກເຂົາສ້າງຕັ້ງຂຶ້ນເມື່ອໃດ?

- schools: ໂຮງຮຽນ:
- hospitals: ໂຮງໝໍ:
- roads: ເສັ້ນທາງ:
- electricity: ໄຟຟ້າ
- phone & internet connection: ໂທລະສັບ ອິນເຕີເນັດ
- Irrigation schemes: ຊົນລະປະທານ
- How and from where people get the drinking water: ປະຊາຊົນຕ້ນ້ໍາດື່ມ ຢູ່ໃສ່ ແລະ ເມື່ອໃດ

4. What percent of the households in the village have access to electricity? (24 hours a day? If not, how many hours per day?) ເປີເຊັນຂອງຄົວເຮືອນໃນບ້ານທີ່ໄດ້ຊົມໃຊ້ໄຟຟ້າແມ່ນເທົ່າໃດ? (24 ຊົ່ວໂມງຕໍ່ມື້? ຖ້າບໍ່, ຈັກຊົ່ວໂມງຕໍ່ມື້?)

5. Has there been major problems related to electricity access (shortages, power cuts, no grid etc.)? ມີບັນຫາໃຫຍ່ທີ່ກ່ຽວຂ້ອງກັບການເຂົ້າເຖິງໄຟຟ້າ (ການຂາດແຄນ, ການຂາດໄຟຟ້າ, ບໍ່ມີຕາຂ່າຍໄຟຟ້າແລະອື່ນໆ) ?

6. Status of the infrastructure relative to the neighboring villages? (is this village on average, poorer, richer, or what?) ສະຖານະພາບຂອງໂຄງລ່າງທີ່ກ່ຽວຂ້ອງກັບບ້ານໃກ້ຄຽງບໍ? (ໝູ່ ບ້ານນີ້ໂດຍ ສະເລ່ຍ, ທຸກຍາກກວ່າ, ຮັ່ງມີ, ຫລືແມ່ນຫຍັງ?)

Economy background and livelihoods ພື້ນຖານເສດຖະກິດແລະຊີວິດການເປັນຢູ່

7. What are the main sources of income in the village? Cash income? Subsistence? Main crops? ແຫຼ່ງລາຍໄດ້ຕົ້ນຕໍໃນບ້ານແມ່ນຫຍັງ? ລາຍໄດ້ເປັນເງິນສົດບໍ? ກຸ້ມຕົນເອງ? ພືດຕົ້ນຕໍ?

Cash income? ລາຍໄດ້ສົດ	*Main crops for subsistence?* ພືດຕົ້ນຕໍ ສໍາ ລັບການລ້ຽງຊີບ?
1.	
2.	
3.	
4.	
5.	

8. Have there been any significant changes in livelihoods of the villagers in the past ten years? ມີການປ່ຽນແປງທີ່ ສໍາ ຄັນໃນຊີວິດການເປັນຢູ່ຂອງຊາວບ້ານໃນສິບປີທີ່ຜ່ານມາ

9. What are the main criteria for wealth in the community? ມາດຖານຫລັກ ສໍາ ລັບຄວາມຮັ່ງມີໃນຊຸມ ຊົນມີຫຍັງແດ່?

1.
2.
3.
4.
5.

10. What percentage of the community is rich, middle, poor and very poor? Do you have any records on the households? ເປີເຊັ້ນຂອງຊຸມຊົນທີ່ ຮັ່ງມີ, ປານກາງ, ຜູ້ທຸກຍາກ ແລະ ທຸກຍາກຫຼາຍ? ທ່ານມີບັນທຶກກ່ຽວກັບຄົວເຮືອນບໍ?

Village landscape and policies ພູມສັນຖານບ້ານແລະນະໂຍບາຍ

11. Are there any forest conservation programs implemented in the village area? If yes, specify.
ມີບັນດາໂຄງການທີ່ເຮັດກ່ຽວກັບການອະນຸລັກປ່າໄມ້ທີ່ຖືກຈັດຕັ້ງປະຕິບັດຢູ່ໃນເຂດບ້ານບໍ? ຖ້າແມ່ນ ແລ້ວ, ລະບຸ.

12. Are there conserved or protection forest areas in the village area? If yes, what, how much and how can these be used by villagers? ມີເຂດປ່າສະຫງວນ ຫລື ປ່າປ້ອງກັນໃນບໍລິເວນ ໝູ່ ບ້ານບໍ? ຖ້າ ແມ່ນ, ແມ່ນຫຍັງ, ຊາວບ້ານຈະໃຊ້ມັນໄດ້ທໍ່າໃດ?

13. Which types of forest policy and law changes are the villagers informed about?
ຊາວບ້ານໄດ້ແຈ້ງໃຫ້ຊາບກ່ຽວກັບນະໂຍບາຍປ່າໄມ້ ແລະ ການປ່ຽນແປງກົດ ໝາຍ ປະເພດໃດແດ່?

14. Are there any forest associations or farming cooperative groups in the village? What are the benefits & disadvantages? ມີສະມາຄົມປ່າໄມ້ຫລືກຸ່ມສະຫະກອນກະສິ ກໍາ ໃນ ໝູ່ ບ້ານບໍ? ຜົນປະໂຫຍດ ແລະຂໍ້ເສຍແມ່ນຫຍັງ?

15. Are there any development projects or investments in the village, -ongoing, or past?
ມີໂຄງການພັດທະນາ ຫລື ລົງທຶນຢູ່ໃນບ້ານ, ທີ່ກຳລັງດຳເນີນ, ຫລື ໃນອະດີດບໍ?
Describe ອະທິບາຍ:

16. Are there any large concession or plantation areas in the village or close by the village (*e.g. rubber, eucalyptus, palm oil or cash crop*)? If yes, which species and who owns the plantations?
ມີເຂດ ສຳ ປະທານຫລືເຂດປູກຕົ້ນໄມ້ໃຫຍ່ໆໃນບ້ານຫລືໃກ້ບ້ານ (ເຊັ່ນ: ຢາງພາລາ, ໝາກ ອຶ, ນ້ຳມັນປາມ ຫລືພືດເສດຖະກິດ)? ຖ້າມີ, ປະເພດໃດແລະໃຜເປັນເຈົ້າຂອງສວນປູກ?

Plantation species ຊະນິດປ່າປູກ	***Owner (1. private, 2. community ,3. state) ເຈົ້າຂອງ ສ່ວນຕົວ ລັດ ຊຸມຊົນ***
1.	
2.	
3.	
4.	
5.	

17. How the large plantations and/or concessions have affected to households' livelihoods in the village? ການປູກຕົ້ນໄມ້ ຫລື ການສຳປະທານໄດ້ສົ່ງຜົນກະທົບແນວໃດຕໍ່ຊີວິດການເປັນຢູ່ຂອງຄົວເຮືອນ ໃນບ້ານ?

Forests, land tenure and land use ປ່າໄມ້, ສິດຄອບຄອງທີ່ດິນແລະການ ນຳ ໃຊ້ທີ່ດິນ

18. **Village land area & changes** *(Land use/zoning changes in the village in the past 10 years).*
ເນື້ອທີ່ດິນຂອງບ້ານແລະການປ່ຽນແປງ (ການ ນຳ ໃຊ້ທີ່ດິນ / ການແບ່ງເຂດປ່ຽນແປງໃນບ້ານໃນ *10* ປີ ທີ່ຜ່ານມາ).

Land category ປະເພດດິນ *(code)* ລະຫັດ	**Current land area ເນື້ອທີ່ດິນປະຈຸ**	**Changes in the last 10 years ການປ່ຽນແປງໃນ10 ປີຜ່ານມາ**				ອະທິບາຍ ກ່ານປ່ຽນ ແປງ
		Increased	Decreased	Stable	Variable	

		ບັນ ເປັນ ເຮຕາ (ha)	ເພີ່ມ	ຫຼຸດ	ຄົງທ່າ	ຕ້ອ ປ່ຽນແປງ	Explain the changes
1. Residential/Construction land (can include home garden) ດິນປູກສ້າງ							
2. Agriculture land (includes fruit trees e.g. oranges, & vegetable gardens sometimes) (ດ ິ ນກ ະ ສ ິ ກ ຳ)							
3. Paddy land ດິນນາ							
4. Pasture land ຄັງລ້ຽງສັດ							
5. Shifting land currently with crop ດິນໄຮ່ເກົ່າ							
6. Fallow shifting land ດິນປ່າເລົ່າ	1. ປ່າເລົ່າ						
	2. ປ່າເລົ້າ						
	3. ປ່າເລົ້າ						
7. Pond (aquaculture) ໜອງປ່າ							
8. Production/utilization forest ປ່າຜະລິດ							
9. Protection forest ປ່າປ້ອງກັນ							
10. Conservation forest (village) ປ່າສະຫງວນ							
11. National Protected areas ປ່າສະຫງວນແຫ່ງຊາດ							

12. Cultural forest areas (cemetery or sacred forest) ປ່າສັກສິດ ຫຼື ປ່າຊ້າ						
13. Other (specify) uen uen ປ່າອື່ນໆ						
TOTAL LAND AREA (ha) ລວມທັ້ງເນື້ອທີ່ດິນ						

19. Estimate, how much forest area has been cleared/converted in the past 10 years? (ha, &/or %) ຄາດຄະເນວ່າ, ເນື້ອທີ່ປ່າໄມ້ທີ່ຖືກຖ່າງ / ປ່ຽນໃນ 10 ປີທີ່ຜ່ານມາແມ່ນເທົ່າໃດ? (ha, & / ຫຼື%)

20. What was the forest cleared for (*Tree plantations, agriculture cropland, pasture land, residential land or other (specify))?*
ມີການ ຖ່າງປ່າໄມ້ເຮັດຫຍັງແດ່ (ການປູກຕົ້ນໄມ້, ການປູກຝັງກະສິ ກຳ, ທີ່ດິນ ທຳ ມະຊາດ, ທີ່ຢູ່ອາໄສ ຫລືອື່ນໆ (ລະບຸ))?

21. What kind of problems have deforestation and forest degradation caused in the area?
ມີບັນຫາປະເພດໃດແດ່ທີ່ມີການຕັດໄມ້ ແລະ ທຳ ລາຍປ່າ ຢູ່ໃນພື້ນທີ່?
Shifting cultivation?
ການເຮັດໄຮ່ເລື່ອນລອຍ ?

21.1 How do these problems influence the households' livelihoods in the village?
ບັນຫາເຫຼົ່ານີ້ມີຜົນກະທົບແນວໃດຕໍ່ຊີວິດການເປັນຢູ່ຂອງຄົວເຮືອນໃນບ້ານ?

22. How have access rights (*to collect, use and own*) to forest resources and availability of forest resources/Non-timber forest products (NTFPs) changed in the past ten years?
ສິດທິໃນການເຂົ້າເຖິງ (ເພື່ອເກັບ ກຳ, ນຳ ໃຊ້ແລະເປັນເຈົ້າຂອງ) ມີຊັບພະຍາກອນປ່າໄມ້ / ຜະລິດຕະພັນ ປ່າໄມ້ທີ່ບໍ່ແມ່ນໄມ້ (NTFPs) ໄດ້ປ່ຽນແປງແນວໃດໃນສິບປີທີ່ຜ່ານມາ?
Access rights: ສິດທິໃນການເຂົ້າເຖິງ:

Availability: less NTFPs, too much harvest: ມີ: ເຄື່ອງປ່າຂອງດົງ ໜ້ອຍ, ການເກັບກ່ຽວຫຼາຍເກີນໄປ

22.1 If there are changes, what are the reasons? Please explain.
ຖ້າມີການປ່ຽນແປງ, ມີເຫດຜົນຫຍັງແດ່? ກະລຸນາອະທິບາຍ

Appendix 4. Rapid Rural Appraisal questionnaire

Rapid Rural Appraisal questions

Changes in rural livelihoods and land use, Luang Prabang local-level fieldwork

Laos, Nov-Dec 2019

Control information

District name (code)	
Village name (code)	
GPS Code	
Location Waypoints:	
Date of Interview	____/_____/ 2019
Interviewer Name	
Interview No.	
Interview Length	From: _____ : _____ To _____ : _____. TOTAL: ____

Introduction

Before starting the interview, introduce yourself, and explain what the research project is about, and why we are in their district. Explain that we already have permission to do the research from the national and provincial levels and show the paperwork if needed. ➔ *see separate intro doc.*

My name is _____. I am part of a team of researchers and students from the University of Helsinki in Finland. We are doing a field-research on changes in households' livelihoods and land use. We have selected three villages in Nambak District to do this. Any information you tell us will be kept confidential, and only used for the purposes of our survey. We greatly appreciate your cooperation and time.

Respondent information

Respondent's Name: (Mr/Ms)	
Position/title in the village:	
Tel:	
Email:	

Questions

1. When was the village established, what is the resettlement & consolidation history?

2. What ethnic groups are represented in the village (names, %)

3. Is the population of the village increasing or decreasing?

- What is causing the change?

4. What are the main livelihood activities of people in the village?

5. What is the main staple food crop?

6. What are the main cash crops?

7. Does the village have any of the following land-use activities (describe briefly):

1. Large-scale or intensive agricultural activities (maize, biofuel & other cash crops, etc.)

2. Forest plantations (teak, other)

3. Rubber

4. Different kinds of smallholder tree management systems (woodlots, fallows shifting land, and agroforestry systems).

5. Production/utilization forest

7. Protection forest/National protected areas

8. What are the main forest products (timber, NTFPs)?

9. Has there been any significant changes in land use of the village or the surrounding area last 5 years? Last 10 years? If so, what?

10. Has there been any significant changes in the livelihood activities of the households last 5 years? Last 10 years? If so, what?

11. When did the village get electricity?

- where does it come from and who paid for it?

12. When did the village get the road?

- who paid for it?